

1973

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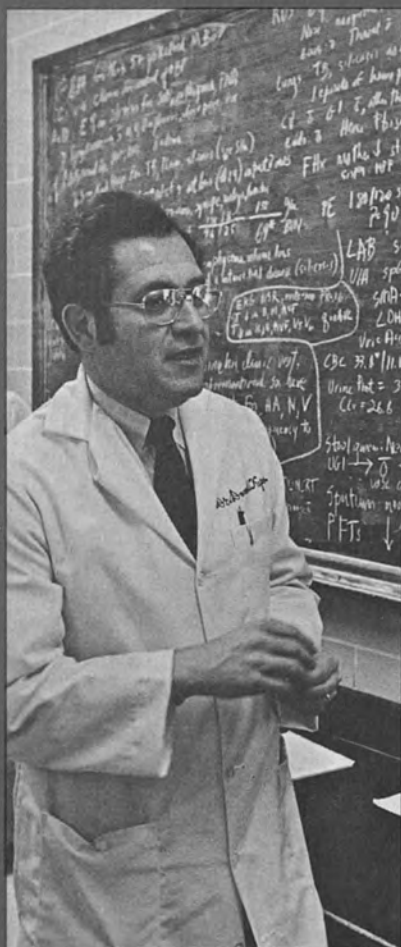
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BULLETIN OF WASHINGTON UNIVERSITY

St. Louis, Missouri

SCHOOL OF MEDICINE

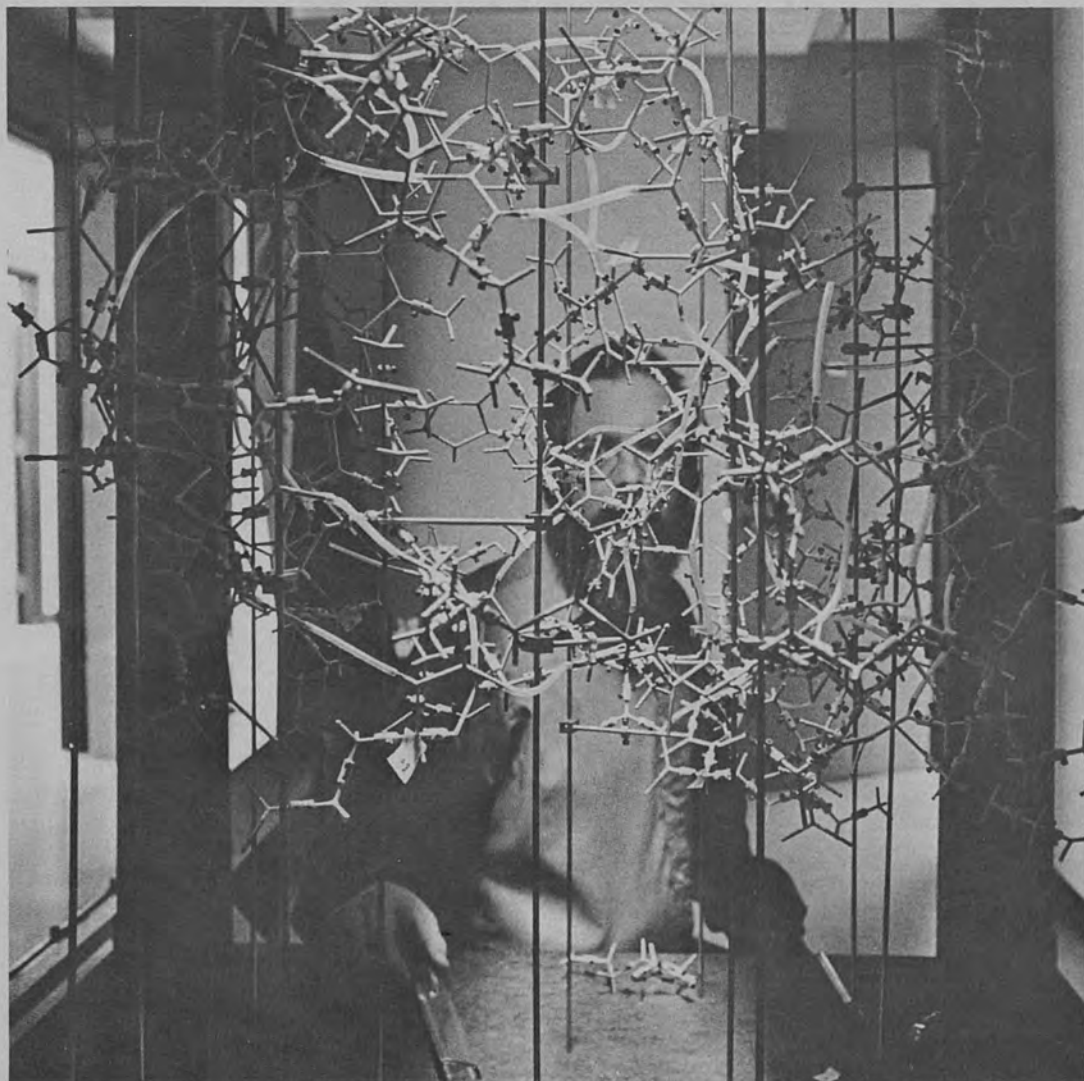


*L. Miller
Anatomy*

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Both the man of science and the man of
art live always at the edge of mystery,
surrounded by it; both always, as the
measure of their creation, have had to do
with the harmonization of what is new and
with what is familiar, with the balance
between novelty and synthesis, with the
struggle to make partial order
in total chaos.

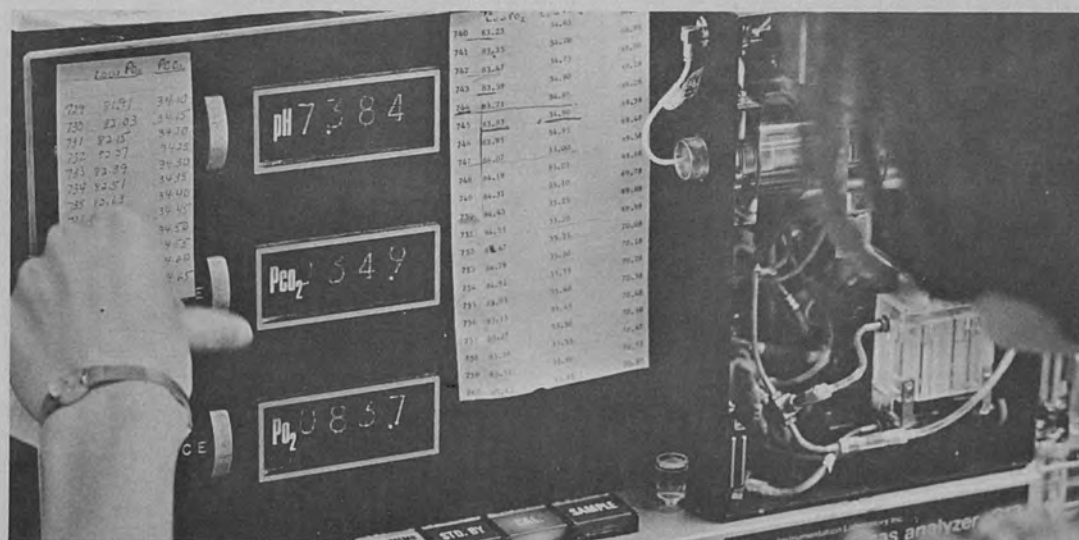
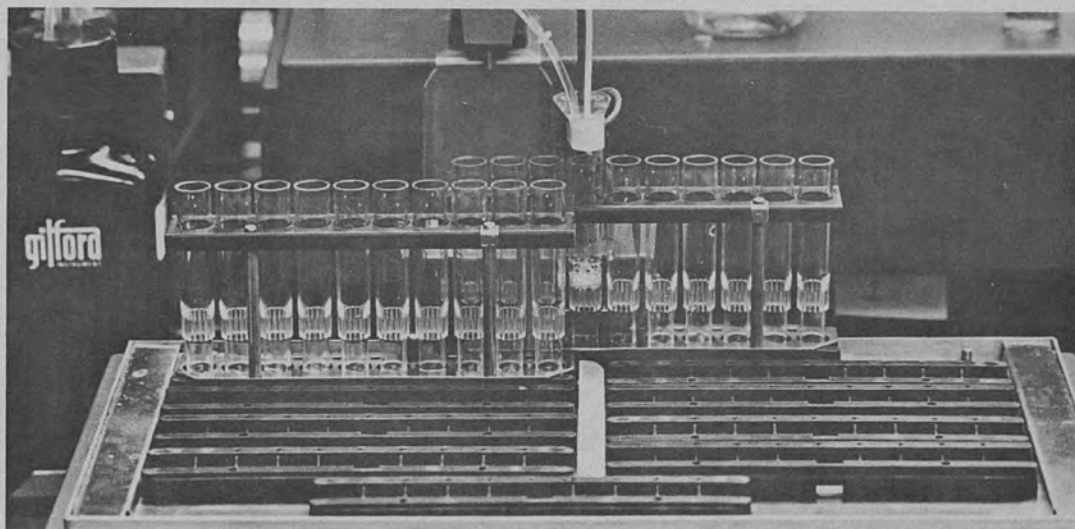
J. Robert Oppenheimer



Is there any greater joy than to see the fire
kindled in a student and to watch it carry
him forward into a successful career.

Herbert S. Gasser

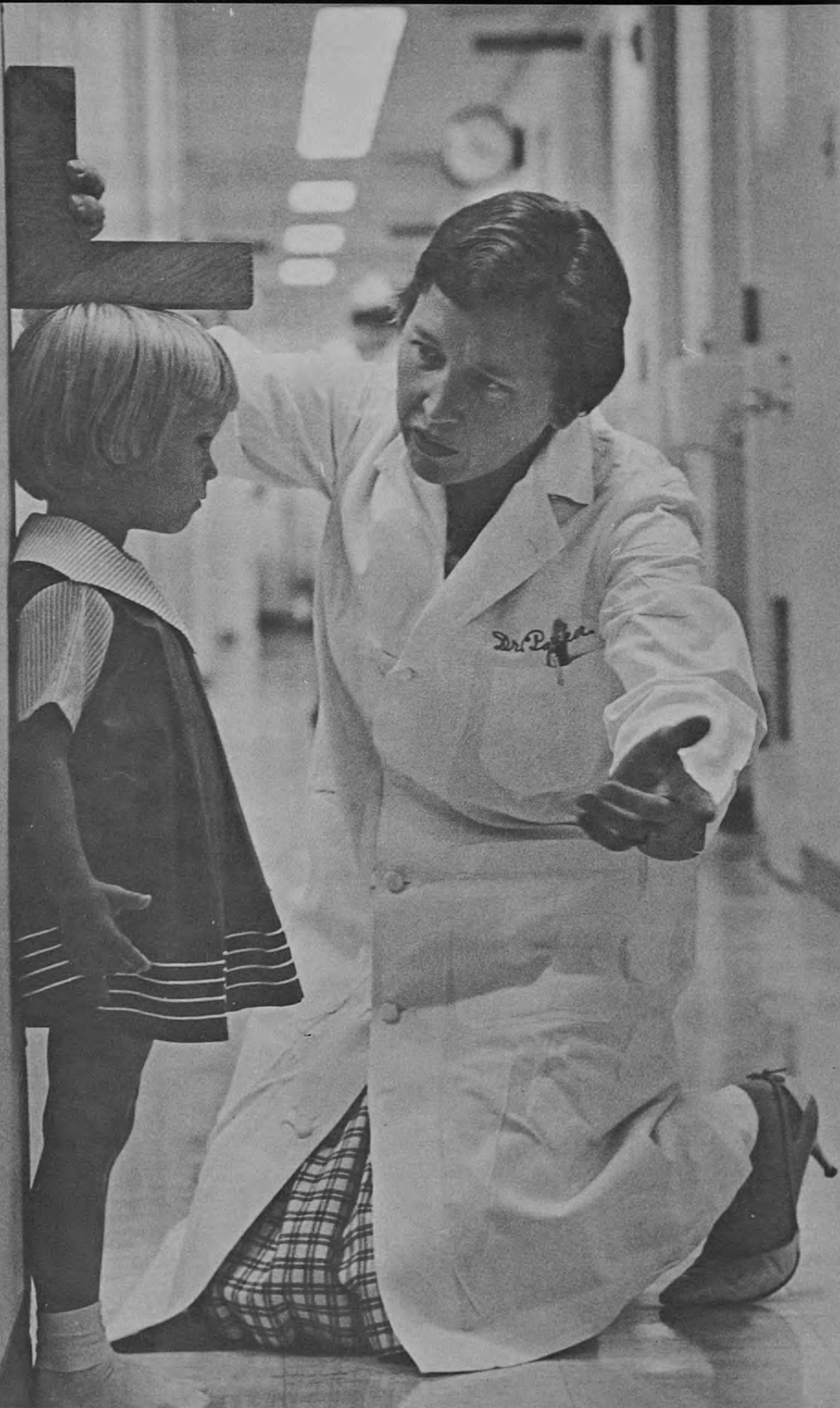




The physician realizes the futility of simply treating illness as it appears in his patients, and he sincerely wants to do much more. All people are throughout life adjusting themselves to alterations in their physical and social environments, and it is in this changing equilibrium that the physician strives to bring out the best in his patients.

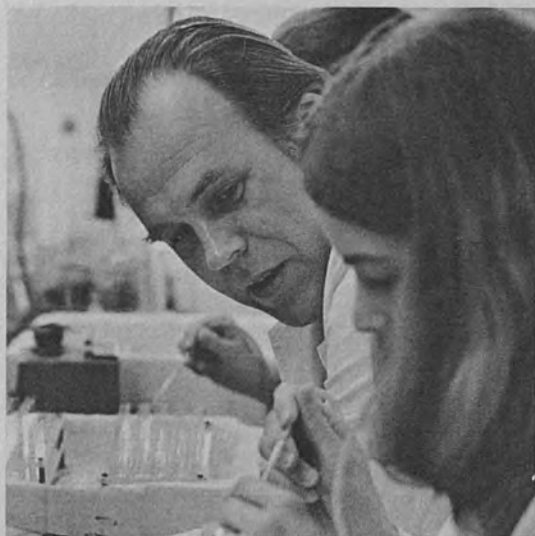
Edmund V. Cowdry

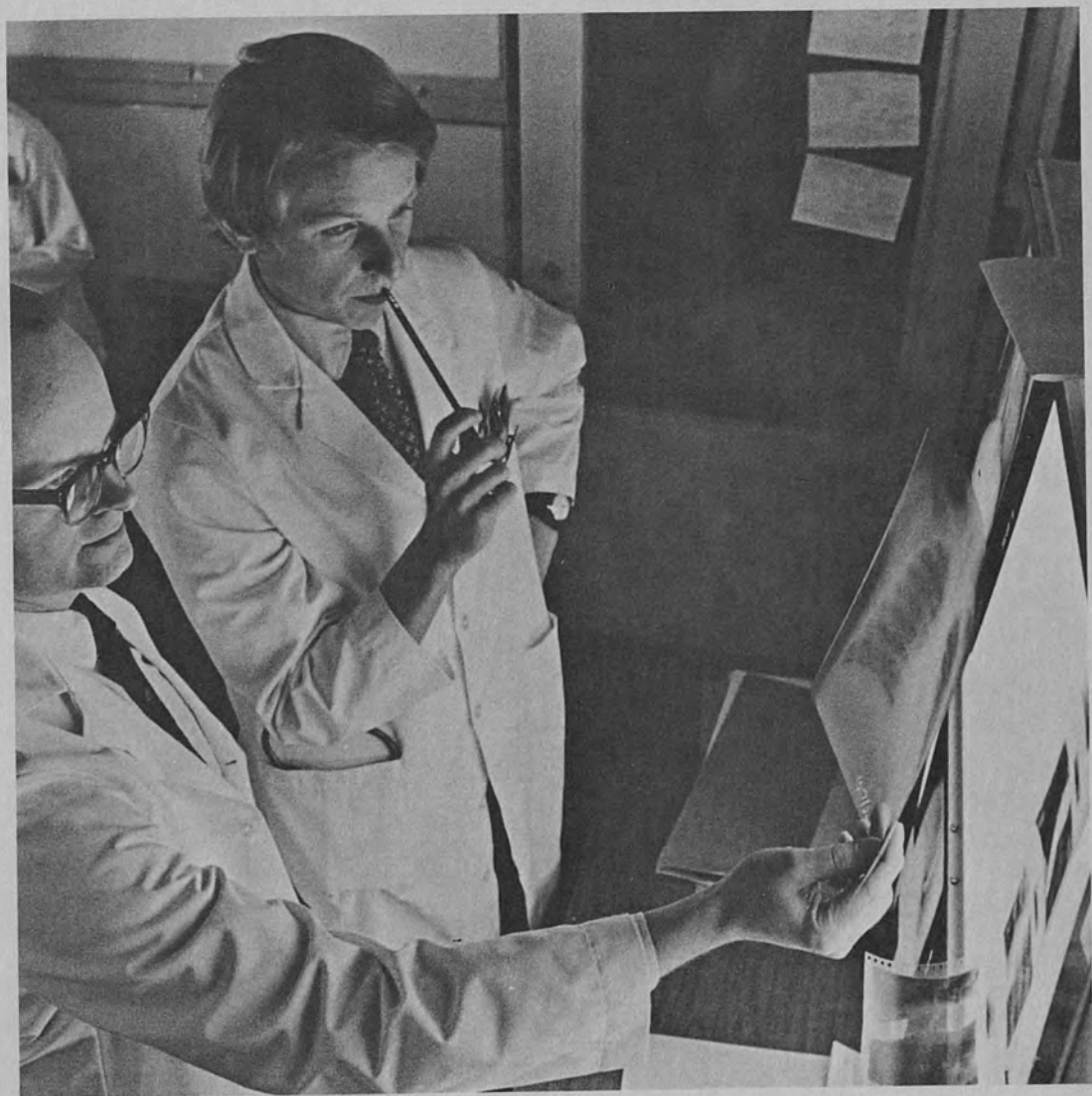


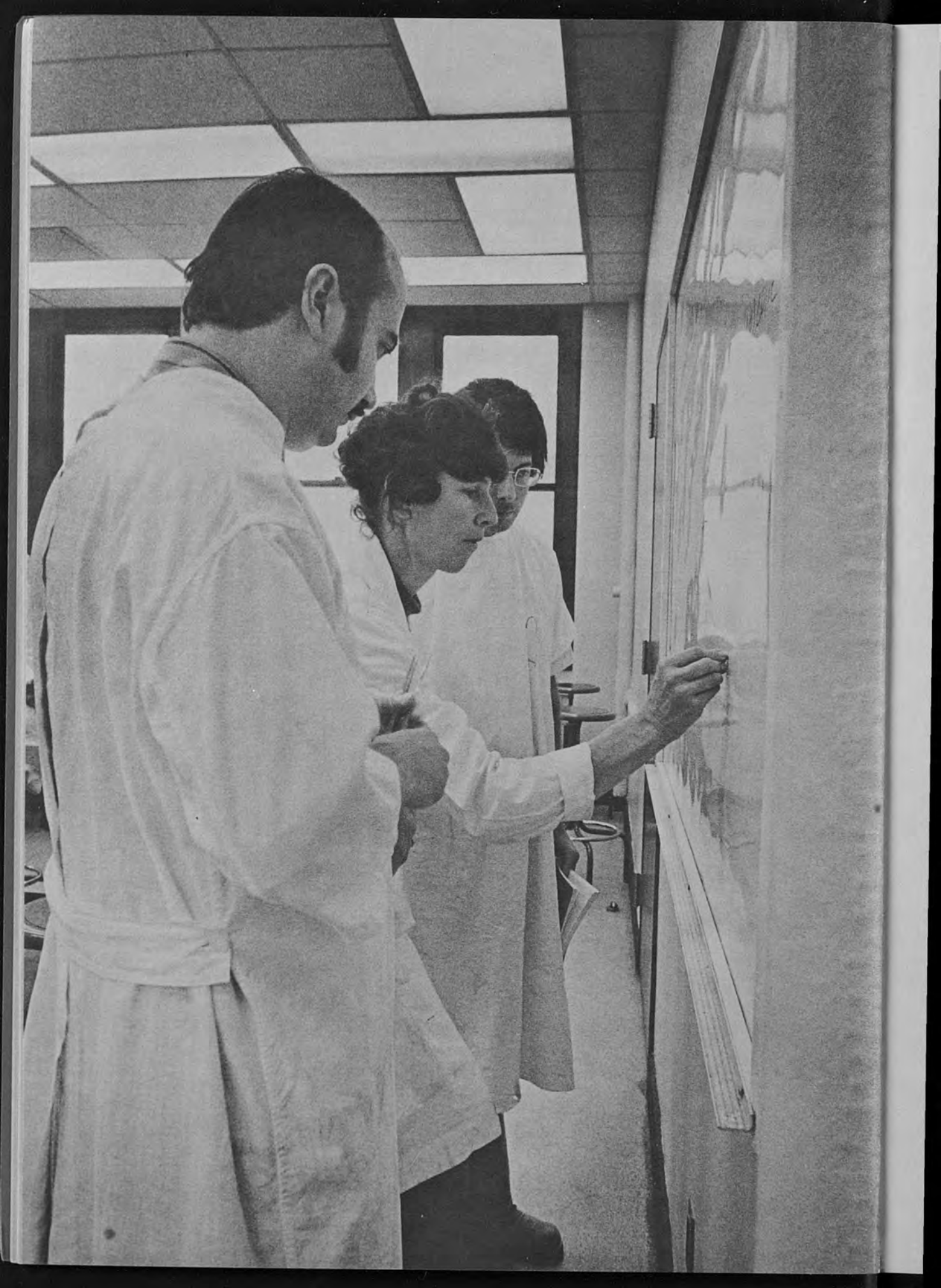


The whole point of a university, on its educational side, is to bring the young under the intellectual influence of a band of imaginative scholars.

Alfred North Whitehead

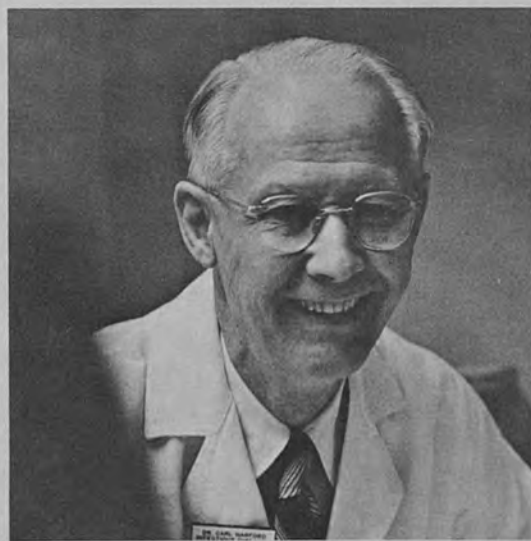
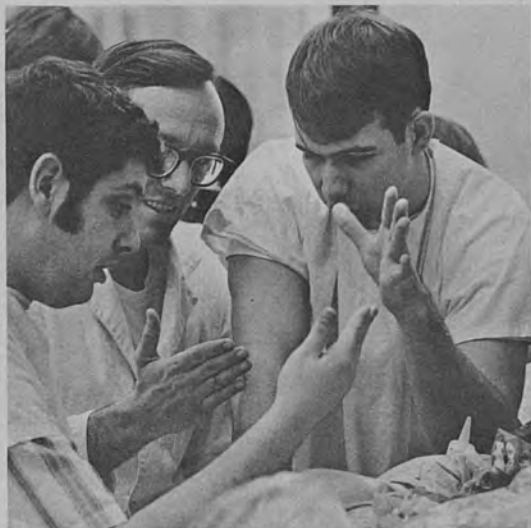
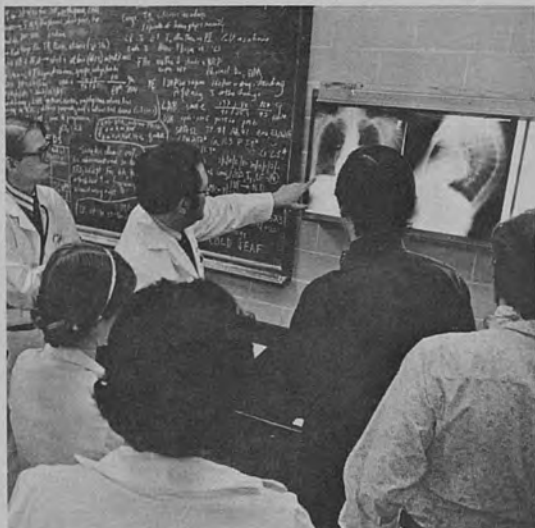






Scientific problems are never disposed of
by a single worker, however ideal his
opportunity, however great his ability, for
the questions to be put to nature vary
from one generation to another.

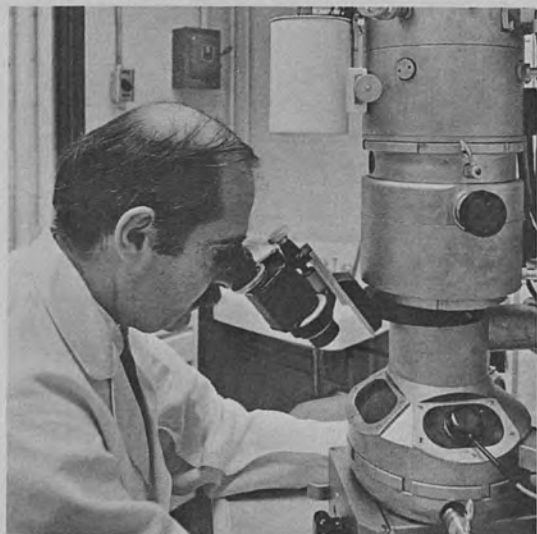
Joseph Erlanger





The on-rushing flood of future possibilities brings with them a spirit of adventure; a need for bold, imaginative thinking; a willingness to gamble on provocative new concepts; the courage to break away from the entrenched viewpoint and the aggressiveness to bring them into reality.

Wendell G. Scott



Medicine is a jealous god expecting to receive from its votaries all of their talent and energy. It lavishes no rewards upon those who are not fully consecrated to its service.

Evarts A. Graham



BULLETIN OF WASHINGTON UNIVERSITY
St. Louis, Missouri
SCHOOL OF MEDICINE



July 1, 1973

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Calendar

1973-74

1973

August

- 29 Wednesday.** Orientation and registration for all new students.
- 31 Friday.** Registration for upper-class medical and graduate students.

September

- 3 Monday.** Labor Day, holiday.
- 4 Tuesday.** Classes begin.

November

- 22 Thursday.** Thanksgiving Day, holiday.
- 23 Friday.** Thanksgiving holiday for freshman and sophomore classes.
- 26 Monday.** Winter quarter begins.

December

- 22 Saturday.** Christmas recess begins at 1:00 p.m.

1974

January

- 7 Monday.** Christmas recess ends at 8:00 a.m.
- 14 Monday.** Registration for all medical and graduate students, second semester.
- 21 Monday.** Second semester begins.

March

- 4 Monday.** Spring quarter begins.
- 27 Wednesday.** Senior Research Assembly.

April

- 5 Friday.** Spring recess begins at 5:00 p.m. for freshman and sophomore classes.
- 12, 13 Friday, Saturday.** Easter holiday for upperclass medical students.
- 15 Monday.** Spring recess ends at 8:00 a.m.

May

- 24 Friday.** Commencement.
- 25 Saturday.** Academic year ends for junior class.
- 27 Monday.** Memorial Day, holiday for freshman and sophomore classes.
- 30 Thursday.** Academic year ends at 5:00 p.m. for freshman and sophomore classes.

June

- 10 Monday.** Summer session begins.

July

- 4 Thursday.** Independence Day, holiday.

August

- 31 Saturday.** Summer session ends.

1974-75

1974

August

- 28 **Wednesday.** Orientation and registration for all new students.
- 30 **Friday.** Registration for upper-class medical and graduate students.

September

- 2 **Monday.** Labor Day, holiday.
- 3 **Tuesday.** Classes begin.

November

- 25 **Monday.** Winter quarter begins.
- 28 **Thursday.** Thanksgiving Day, holiday.
- 29 **Friday.** Thanksgiving holiday for freshman and sophomore classes.

December

- 21 **Saturday.** Christmas recess begins at 1:00 p.m.

1975

January

- 6 **Monday.** Christmas recess ends at 8:00 a.m.
- 13 **Monday.** Registration for all medical and graduate students, second semester.
- 20 **Monday.** Second semester begins.

March

- 3 **Monday.** Spring quarter begins.
- 21 **Friday.** Spring recess begins at 5:00 p.m. for freshman and sophomore classes.
- 26 **Wednesday.** Senior Research Assembly.
- 28, 29 **Friday, Saturday.** Easter holiday for upperclass medical students.
- 31 **Monday.** Spring recess ends at 8:00 a.m.

May

- 23 **Friday.** Commencement.
- 24 **Saturday.** Academic year ends for junior class.
- 26 **Monday.** Memorial Day, holiday for freshman and sophomore classes.
- 29 **Thursday.** Academic year ends at 5:00 p.m. for freshman and sophomore classes.

June

- 9 **Monday.** Summer session begins.

July

- 4 **Friday.** Independence Day, holiday.

August

- 30 **Saturday.** Summer session ends.

Historical Perspective

The Washington University School of Medicine was formed in 1899 by the union of the first two medical schools established west of the Mississippi River: the Missouri Medical College and the St. Louis Medical College. These schools were popularly known as McDowell's College and Pope's College because of their close identification with their respective deans.

These pioneer colleges set high standards for medical education during the heyday of the medical diploma mills, when there were three times as many medical schools operating in the city of St. Louis as there now are in the entire state of Missouri. They raised their graduation requirements, so that at the time they became associated in 1899, each required its students to complete satisfactorily a four-year graded course for the M.D. degree.

Both colleges were particularly fortunate in attracting men of energy, integrity, and skill. Members of their faculties were well known at home and abroad. Charles A. Pope at thirty-six became the youngest president in the first hundred years of the American Medical Association, and his successor as professor of surgery at the St. Louis Medical College, E. H. Gregory, was elected president in 1886. John T. Hodgen, a graduate of the Missouri Medical College and later dean and professor of surgical anatomy at the St. Louis Medical College, was president of the American Medical Association in 1880. Hodgen originated the splint, which is still used today, for hip fractures.

From their beginnings, each college sought university affiliation. The St. Louis Medical College was established as the Medical Department of St. Louis University, became



independent in 1855, and affiliated with Washington University in 1891, although it retained its name until the union with the Missouri Medical College in 1899. The Missouri Medical College, first established as the Medical Department of Kemper College, was later the medical department of the University of Missouri. It finally became independent in 1857. In 1899, the Missouri Medical College affiliated with the St. Louis Medical College, and thus formed the Medical Department of Washington University.

In 1909, Abraham Flexner began a survey of 155 medical schools in the United States and Canada for the Carnegie Foundation for the Advancement of Teaching. A similar survey by the American Medical Association and Flexner's survey, the famous Bulletin Number Four on the state of medical education in the United States and Canada, created a national sensation. Some schools collapsed, others pooled their resources, while still others reorganized.

The Medical School of Washington University did not escape criticism. In the report Flexner made to Dr. Henry Pritchett, president of the Carnegie Foundation for the Advancement of Teaching and former professor of astronomy at Washington University, he said that one of two courses must be adopted: "the department must be either abolished or reorganized."

Dr. Pritchett mailed the report to Robert S. Brookings, a St. Louis merchant who was president of the Board of Directors of Washington University. Mr. Brookings was shocked and immediately went to New York to see Flexner, demanding proof that the conditions were as bad as described.

Mr. Flexner returned to St. Louis with Mr. Brookings, and the two men went through the School. In less than two hours Mr. Brookings was convinced that drastic action was necessary if the School were to be of highest caliber.

The meeting in 1909 of Robert S. Brookings and Abraham Flexner was of unsurpassed significance in the history of the Washington University School of Medicine, for it led to the complete reorganization of the School and the establishment of the present Medical Center. Abraham Flexner inspired the dream of a model medical school. Robert S. Brookings accepted the challenge, and with the energy and vision which characterized all his enterprises, made the dream a reality.

No time was lost in making changes. The Bulletin of the Medical School for July, 1910, makes the following general statement: "The Corporation of the University, becoming convinced that in no other direction could greater service be rendered than through a great, modern medical school, determined to reorganize the School and to place it in the front rank of American medical institutions. It has called to the heads of a number of the leading departments the ablest men it could secure, who shall give their time to teaching and research, providing each with a staff of permanent assistants, who likewise give their time to instruction and research, and has associated with this staff groups of the strongest men in the medical profession in St. Louis."

When Robert A. Barnes died in 1892, he left a will which directed that the trustees of his estate should use \$800,000 for the

8 The School of Medicine

erection and equipment of a hospital "for sick and injured persons, without distinction of creed, under the auspices of the Methodist Episcopal Church, South." Investigation by the trustees into the cost of building a modern hospital convinced them that the sum was not large enough to build an efficient, fireproof building, and they therefore invested the trust. By 1912, the value had increased to two million dollars, a sum which permitted the building of a hospital and left an endowment greater than the original fund. The trustees were studying hospital construction at the time Mr. Brookings was studying medical schools.

It was apparent to everyone concerned that the two projects, the building of a medical school and the construction of a modern hospital, were so interrelated that the purpose of each would be more successfully fulfilled by an affiliation. A medical school would provide a highly trained staff and would assure the most modern methods and superior laboratory facilities for the hospital. A teaching hospital would give the patient superior care and provide for students the essential clinical experience consistent with modern medical teaching methods.

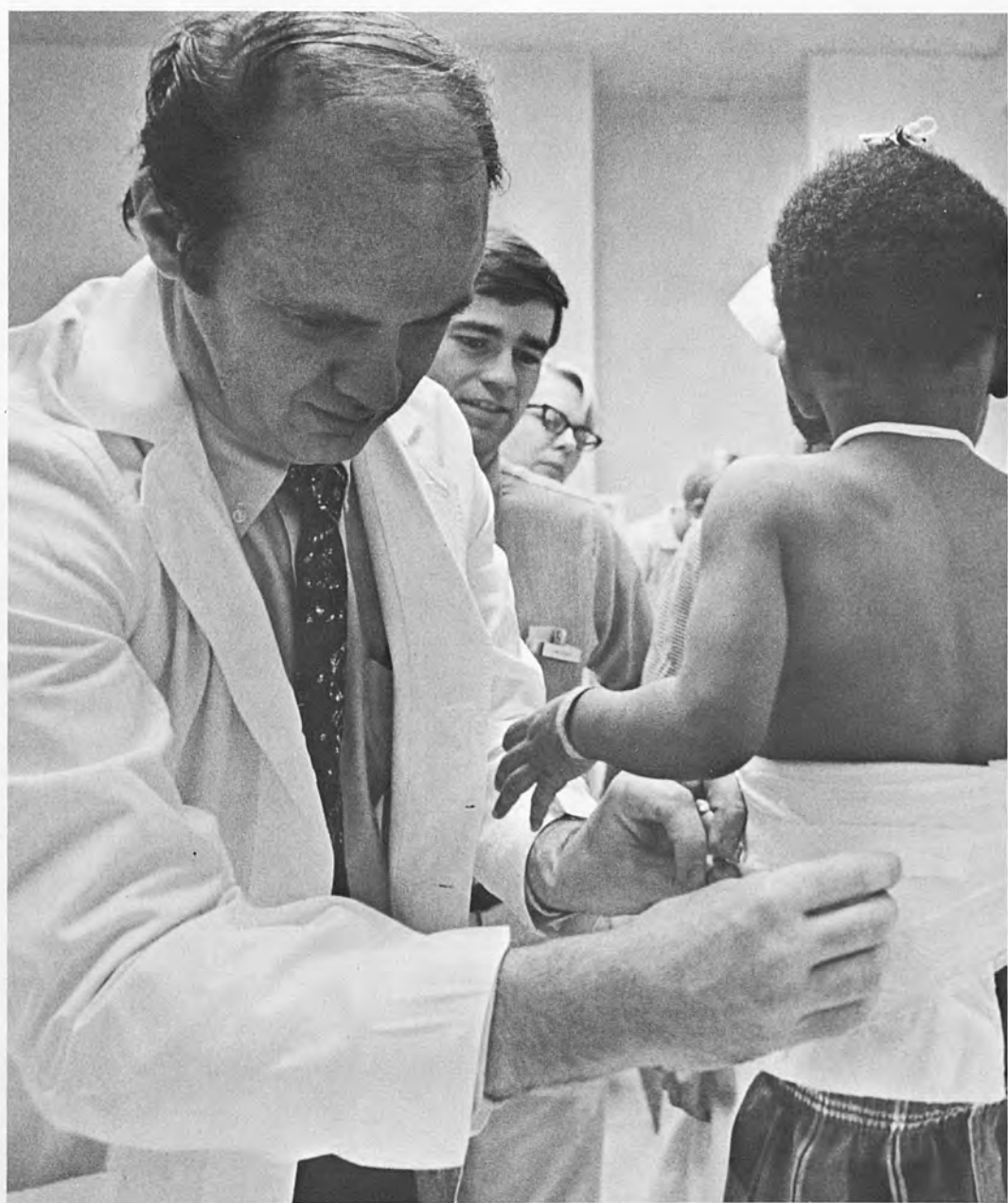
During the spring of 1912, construction was begun on the medical school and hospital buildings which form the nucleus of the present Center. The laboratories were moved from their old quarters in downtown St. Louis into the new buildings on Euclid and Kingshighway during the summer of 1914, and late in the fall of the same year the activities of the Washington University Hospital were transferred to the Barnes Hospital. Concomitantly, the St. Louis Children's Hospital, then located on

Jefferson Avenue, became affiliated with the Medical School and moved to its new quarters in the Medical Center.

In April of 1915, exercises were held to celebrate the completion of this group of buildings designed to promote the practice, the teaching, and the progress of medicine. The dedication ceremonies marked what Dr. William H. Welch, of the Johns Hopkins University, called "one of the most significant events in the history of medical education in America." Robert S. Brookings, the one man most responsible for the reorganization, voiced the hope that "our efforts will contribute, in some measure, to raising the standard of medical education . . . and that we will add, through research activities, our fair quota to the sum of the world's knowledge of medicine."

These prophetic words of Mr. Brookings have been realized. Local, national, and international recognition has come to the School and to members of the faculty. Members of the faculty have received numerous awards; eight Nobel Laureates have worked in the laboratories of the School's medical science departments.

In the ensuing years, the Medical Center has continued to grow and to provide excellent facilities. With the increase in the physical plant there has also occurred a great increase in the size of the faculty; the expansion has been made without compromise in the standards which marked the early development of the Medical Center. As a result, significant achievements in both research and clinical areas have been consistently recorded, and the School of Medicine has continued to attract students and faculty of the highest caliber.



The Study of Medicine

PHILOSOPHY AND OBJECTIVES

The efforts of the School of Medicine are directed toward providing able students with a stimulating and challenging milieu in which they may acquire a thorough background in scientific medicine, as well as a deep understanding of the meaning of comprehensive medical care. In a field that is developing as rapidly as is medicine, education begun in medical school must serve as the foundation for a life-long course of learning. As Sir William Osler pointed out some decades ago, a faculty, no matter how talented, can "only instill principles, put the student in the right path, give him methods, teach him how to study, and early to discern between essentials and non-essentials." The faculty's mission is to preserve the joy of learning and to foster a spirit of discrimination and creativity, for today's student is preparing to cope with a changing world; to contribute, in a constructive, considered way, to resolving problems of medicine and of health care. It is hoped that each student may achieve this grounding during his years in the School of Medicine.

CURRICULUM

The curriculum is the product of prolonged and continuing study, by both faculty and students, of the present and probable future course of medical science and medical practice, and of the ways in which medical education can be kept abreast of this course. It is planned to provide students, who enter medical school with diverse backgrounds and interests and who will undertake a wide variety of careers, with the basic knowledge and skills essential for their further professional development. Modern medical education can no longer hope to be comprehensive;



it must be selective. Yet students must develop facility in the understanding and use of several related technical languages: those of anatomy, chemistry, physiology, and clinical medicine. They must share responsibility for the care of the patient. They must also learn how these areas of endeavor are interrelated, how the organization and needs of society influence the methods of providing medical care, and how new knowledge is acquired and old knowledge re-evaluated.

The curriculum includes a core experience based upon a sequence of courses that will introduce the student to the broad panorama of medicine. The principles, the methods of investigation, the problems, and the opportunities in each of the major disciplines of medical science and medical practice are presented in such a way as to help the student select the career best suited to his abilities and goals.

The curriculum also embraces a broad elective program, new courses in genetics, social aspects of medicine, and radiology; a revised and expanded course in pathophysiology; increased coordination between the courses in pathophysiology and those in pathology and pharmacology; increased coordination between the courses in neuroanatomy and neurophysiology; and a generally more satisfactory sequence of all the preclinical courses.

The elective program helps the student to decide where his major interests lie. It also enables him to benefit from the wide range of specialized knowledge and skills found in the faculty. As there is not enough time for each student to be introduced to each of today's areas of specialization, the elective program permits him to select, according to his own desires, the areas he wishes to explore or to study in depth.

Table of Required Hours 1973-74

As reported to the Liaison Committee on Medical Education, representing the Council on Medical Education of the American Medical Association and the Executive Council of the Association of American Medical Colleges, credit hours for courses are expressed in terms of clock hours—the scheduled hours per year of actual lecture and laboratory contact between faculty and students. These clock hours are not to be interpreted as semester or quarter hours.

First-year Courses are taught during the 36-week academic year.

Gross Anatomy	198
Biochemistry	216
Microbiology	180
Social Aspects of Medicine	36
Physiology	198
Microscopic Anatomy	162
Neural Sciences	126
Genetics	36
Topics in Clinical Medicine	36
Biostatistics	18

Total clock hours for the year1206

Second-year Courses are taught during the 36-week academic year.

Pathology	312
Pharmacology	180
Pathophysiology (including Laboratory Medicine and Epidemiology)	318
Physical Diagnosis	72
Clinical Diagnosis	54
Psychiatry	42
Radiology	36
Obstetrics and Gynecology	36
Surgery	36
Pediatrics	24
Ophthalmology and Otolaryngology ..	18

Total clock hours for the year1128

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Clinical Clerkship (Third) Year is a 48-week academic year.

Medicine	462
Surgery	462
Obstetrics and Gynecology	231
Pediatrics	231
Psychiatry	231
Neurology	115½
Otolaryngology	77
Ophthalmology	38½

Total clock hours for the year 1848

Elective (Fourth) Year is a 48-week academic year. Students are required to attend only 36 weeks.

Each student must take at least two "A" electives (seminars which meet two or more hours each week for 12 or 18 weeks) and at least 36 weeks of "B" electives (usually as clinical clerkships or research).

Total clock hours for the year 1188

Total clock hours for four years 5370

DEGREE PROGRAMS

The Washington University School of Medicine offers three programs leading to the M.D. degree: a regular four-year program, a special five-year program, and a combined M.D./Ph.D. program.

The Washington University Graduate School of Arts and Sciences offers six departmental and three interdepartmental programs of study in the medical sciences leading to the Ph.D. degree. Additional information and the application for admission may be obtained by writing directly to:

Office of Graduate Student Affairs
Box 8072

Washington University School of Medicine
660 South Euclid Avenue
St. Louis, Missouri 63110

Doctor of Medicine, Four-Year Program

By conferring the M.D. degree, the School certifies that the student is competent to undertake a career as a Doctor of Medicine. It certifies further that, in addition to medical knowledge and skills, the graduate possesses qualities of personality—compassion, emotional stability, and a responsible attitude—essential to an effective professional life.

A course of medical education for the M.D. degree ordinarily consists of a minimum of four years of study. Students recommended for the degree of Doctor of Medicine must be of good moral character, they must have completed an entire academic course of instruction as matriculated medical students, they must have passed all required subjects or the equivalent and have received satisfactory grades in the work of the full academic course, and they must have discharged all current indebtedness to the University. Individuals applying for licensure must be twenty-one years of age and must have completed four entire academic years in the study of medicine.

At the end of the final academic year, students who have fulfilled these requirements will be eligible for the M.D. degree.

Doctor of Medicine, Five-Year Program

In addition to the regular four-year program leading to the M.D. degree, this program permits the student to spend one additional year in an investigative or research concentration. The program must be arranged subject to the approval of the Committee on Medical Education.

Combined M.D./Ph.D. Program

Although in 1973, the federally supported

Medical Scientist Training Program was discontinued nationwide, the Washington University School of Medicine continues to offer a program designed for selected students who are interested in a research career and whose undergraduate education has placed major emphasis on science. It permits the student to obtain both the M.D. and the Ph.D. degree, usually within six years of study. The major purpose of the program is to prepare medical scientists, skilled in the study of modern biology, for clinical and preclinical faculties of medicine. Financial support in the form of stipends and tuition remission will be available to all students admitted to the program for a period of six years.

Eligibility

Applicants must meet the requirements for admission to both the School of Medicine and the Graduate School of Arts and Sciences. In addition to the minimum requirements established for acceptance into both schools, students planning to concentrate in disciplines related to the chemical or physical sciences should have completed mathematics through calculus, physics and physical chemistry (with calculus as a prerequisite), and advanced organic chemistry. A course in differential equations is also recommended. For students whose major interests are in the biologic areas of medical science, the requirements for chemistry are less rigorous, but a strong background in mathematics and physics is essential. Although most individuals will enter the program as first-year students, applications will be accepted from students in residence.

The Program

The program consists of three segments: (1) two years of the usual medical curriculum,

(2) three or more years of work in preparing a thesis to satisfy requirements for the Ph.D. degree, and (3) a final year which is the usual clinical year of the medical curriculum. Since the fourth year of medical school is completely elective, the medical scientist will have taken the equivalent of that year while preparing his thesis, and thereby he will have completed the total requirements for the M.D. degree.

While the Medical Scientist Training Program includes all those medical courses required for the M.D. degree, it incorporates a high degree of flexibility for individual students through a wide range of electives and the large number of thesis programs available at Washington University.

The members of the Medical Scientist Training Program Advisory Committee are available to students to help them decide in which elective courses and laboratories they will participate.

Usually the following courses will be taken in the first two years.

Year 1

First Semester: Gross Anatomy, Biochemistry, Microbiology, Social Aspects of Medicine.

Second Semester: Microscopic Anatomy, Physiology, Neural Sciences, Genetics, Topics in Clinical Medicine, Biostatistics.

Year 2

Third Semester: Pathology, Pathophysiology, Pharmacology, Physical Diagnosis.

Fourth Semester: Pathology, Pathophysiology, Pharmacology, Radiology, Neurology, Surgery, Pediatrics, Ophthalmology, Otolaryngology, Psychiatry, Obstetrics and Gynecology, Clinical Diagnosis.

Students begin their training on July 1 of the year they enter the School of Medicine. The first two weeks of the summer will be spent visiting the various departments in the School of Medicine in order to select a laboratory for summer research. Students will also spend the summer between their first and second years doing research. The laboratories selected for summer research need not be the same laboratory ultimately chosen for the Ph.D. portion of the program.

A student who passes a qualifying examination in any of the regularly offered pre-clinical courses will be allowed to substitute either advanced course work or laboratory research in the time made available. In this way many students will have an opportunity to begin supervised research immediately after entry. Research can be continued in free periods during the first two years.

The courses differ from the usual medical courses with respect to the laboratory training periods and the availability of additional electives. As students enrolled in the program will have begun laboratory work during the summer and will receive additional intensive laboratory training, they may elect, with approval of the Medical Scientist Student Advisory Committee, to omit the laboratory component of a course or to take selected parts of a laboratory component. The time not utilized in the normal laboratory components will be spent in research laboratories and in elective tutorial courses which are offered to supplement in depth the normal course material. These courses include advanced biochemistry, microbial genetics, immunology, neurobiology, biophysics, cell biology and cytology, advanced pharmacology, and

pathobiology. In addition, the formal graduate courses are available to the more advanced students.

The performance of each student will be reviewed annually, and he will be expected to maintain a high scholastic standing.

The similarity in course content between the Medical Scientist Training Program and the first two years of the program for the M.D. degree makes it possible for a student to return without loss of time to the regular curriculum after the first two years if this seems advisable.

Years 3, 4, 5

The student will spend the third, fourth, and fifth years, and possibly a sixth year, in satisfying the requirements of the Graduate School of Arts and Sciences for the Ph.D. degree. Before beginning the third year, the student will select a faculty adviser under whom he will do his thesis research and the department or departments in which he will work toward the Ph.D. degree. As prerequisites vary for the different departments, the student should make appropriate inquiries and arrangements well in advance.

Thesis programs are available in the departments of Anatomy, Biological Chemistry, Microbiology, Pathology, Pharmacology, and Physiology and Biophysics. In addition, thesis work may be undertaken in Molecular Biology, Neurobiology, or Biomedical Engineering. The latter three disciplines are administered by interdepartmental committees, and the faculty includes representatives from the Departments of Biology, Chemistry, Chemical Engineering, Electrical Engineering, Mechanical Engineering, Neurology, Ophthalmology, Otolaryngology, Physics, and Psychiatry.

The formal requirements for the Ph.D. degree include (1) completion of course work, (2) successful performance in a qualifying examination, usually at the end of the third year, (3) successful performance in one foreign language examination, (4) execution of original research suitable for a dissertation, and (5) defense of the thesis.

A program of special monthly seminars will be arranged for students during the research years. Conducted by medical scientists of the clinical departments of the School of Medicine, these seminars are aimed at stimulating student interest in clinical medicine and at increasing awareness of major research problems in clinical medicine.

Final Year in Clinical Medicine

The sixth year is the clinical year of the normal medical curriculum. The intensive clinical training provided in this year is the last formal requirement for the M.D. degree. The Ph.D. and M.D. degrees will be granted simultaneously at the end of the final clinical year.

Tutorials and Individualized Programs

The educational program is designed to meet the needs of all medical students in an individual and a personalized way. To help students who may be having academic difficulty or who may wish to reinforce their studies, both group and individual tutorials are offered. The School's experience is that tutorials enable students to handle course work with improved proficiency. Students who are found to have difficulties in handling the normal academic course load will be asked to take an individualized program which would require five rather than four years to complete.



GRADES

In order to assist the student in evaluating his progress, he is graded in each course by the Faculty. In the clinical and elective years, grades are accompanied by detailed descriptive comments characterizing each student's performance. This type of evaluative data is of considerable assistance to the student when he applies for his internship, since it permits the Assistant Dean for Internships to give each hospital to which the student has applied a meaningful comprehensive summary of the student's attributes, abilities, and performance.

Grades are: H = Honors
 HP = High Pass
 P = Pass
 F = Fail

"Honors" is given for a truly outstanding performance, "High Pass" for very good work, and "Pass" for the remaining passing grades. At the end of every academic year, each student receives a grade sheet listing his achievement in each course completed. The student's official transcript, in addition to listing courses and grades achieved, gives the grade distribution in each course with the exception of elective courses.

PROMOTIONS

A faculty Committee on Promotions for each of the four classes reviews the records of all students in the respective class and acts in accordance with specific rules.

First-Year Class

1. All grades below passing should be reported as failure. At the time the grades are reported, the department concerned shall submit an evaluation of the degree of failure and of the amount and kind of remedial action which it considers necessary to bring the student's knowledge of the subject to an acceptable level before reexamination.
2. All students with failing grades shall be informed, as soon as possible, of the Promotions Committee's decision and of the remedial action required before reexamination. Where necessary, reexaminations will be held in mid-August, following the spring semester of the first year.
3. Students who have taken reexaminations and still have failing grades in *two* major courses by the beginning of the fall semester will be required to withdraw from the School or, if there are extenuating cir-

cumstances, from the class. For this purpose, Biochemistry, Microbiology, Gross Anatomy, Physiology, Microscopic Anatomy, Neural Sciences, and Cell Biology are considered major courses. In the case of a student who, after reexamination, has one failure in a major course, the Promotions Committee, on the advice of the department concerned, shall determine when and how the encumbrance must be removed.

4. During, or at the end of, the first year, the Promotions Committee may recommend that a student take an additional year to complete the first year's work. A student who chooses not to accept this recommendation will be permitted to complete the normal course work of the first year and, if necessary, to take reexaminations in courses failed during the following August. However, if such student, after reexamination, still has failing grades in two or more major subjects, he may be dropped from the School. A student who has taken two years to complete the first year's work and still has a failing grade in any major subject will be dropped from the school.

Second-Year Class

1. In major graded courses (Pathology, Pathophysiology, Pharmacology, and Physical and Clinical Diagnosis) all grades below passing shall be reported as failure. At the time grades are reported, the department or teaching unit concerned shall submit an evaluation of the degree of failure and the amount and kind of remedial action that it considers necessary in order to bring the student's knowledge of the subject to an acceptable level before reexamination.



2. All students with failing grades shall be informed as quickly as possible of the Promotions Committee's decision and the remedial action required before reexamination. The Promotions Committee may require a student with failure(s) to take reexamination(s) at the end of the first six or twelve weeks of the summer term following the second year, postponing the start of the third year until failure(s) is (are) removed. If failure(s) is (are) not removed by reexamination by September 1 following the end of the second year, the student may be required to withdraw from school or to repeat the second year. Students who fail a major course or courses after repeating the second year shall be dropped from the school.

Beyond the Second Year

1. A student having failures in two major subjects shall be required to withdraw from the class. At the discretion of the Committee on Promotions, depending upon the student's overall performance, he may be required to withdraw from the School or continue with an individualized program.
2. A student having one failure in a major course at the end of any year shall be required to remove this failure as directed by the department concerned. When and if the failure is removed, the appropriate Committee on Promotions will reevaluate the student's entire record. A student who does not succeed in removing a failing grade shall be required to withdraw from the class.
3. A student shall not be promoted to the third year until he has received satisfactory credit for all required subjects of the first and second years.



4. A student may be allowed, under exceptional circumstances, to repeat certain courses as a special student or to repeat the work of the entire year as a member of a lower class.

STUDENT RESEARCH FELLOWSHIPS

No matter what medical career an individual chooses, it will be essential for him to evaluate and use fresh knowledge as he moves through his professional life. Student Research Fellowships, awarded each year to selected students who undertake research projects under the direction of faculty members, are an important part of the educational program. These fellowships offer students an opportunity to attempt original work, thus adding another dimension to their experience as investigators. This research allows students to discover at first hand the problems of obtaining and assessing new information. Selected faculty members serve as advisers to students interested in special research opportunities.

Fellowships are available to students after admission to the School. They are granted for a minimum of two months. The research must be undertaken during the student's free time or a vacation period. Each year a Senior Research Assembly is held at which the results of student research are presented before the faculty and student body. A number of such studies conducted by students are significant enough to be reported in scientific journals.

INTERNSHIPS AND RESIDENCIES

Although not required by all states for licensure, an internship in an approved hospital is considered essential preparation for the practice of medicine, and most graduates

seek additional experience by serving as residents, and perhaps later as fellows, for periods up to five years.

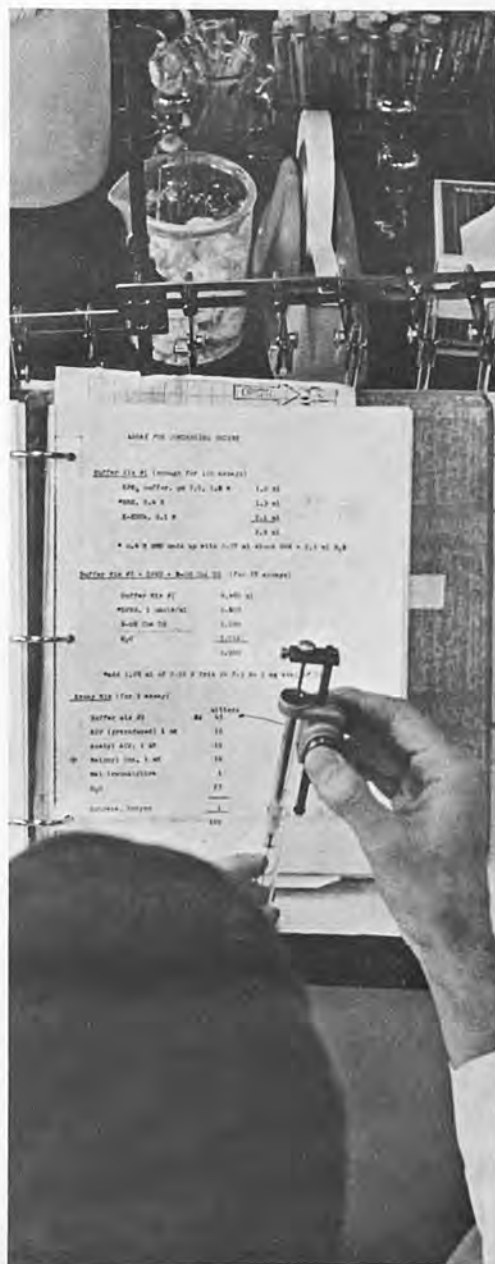
In order to aid students in obtaining desirable intern appointments, an active counseling program is maintained by the Assistant Dean for Internships. Thus, in their junior year, students are provided with general background information about the kinds of internships available. Since many more internships exist than there are candidates in any given year, students are able to exert a considerable measure of selection.

The Assistant Dean for Internships maintains an open file of brochures and other descriptive data regarding internships throughout the country. Included are evaluations of their own internships obtained from our recent graduates. The School participates in the National Intern and Resident Matching Program, which offers distinct advantages to applicants.

The School maintains an active interest in its graduates and is pleased to assist them in subsequent years as they seek more advanced training or staff appointments in the communities in which they settle.

POSTDOCTORAL TRAINING

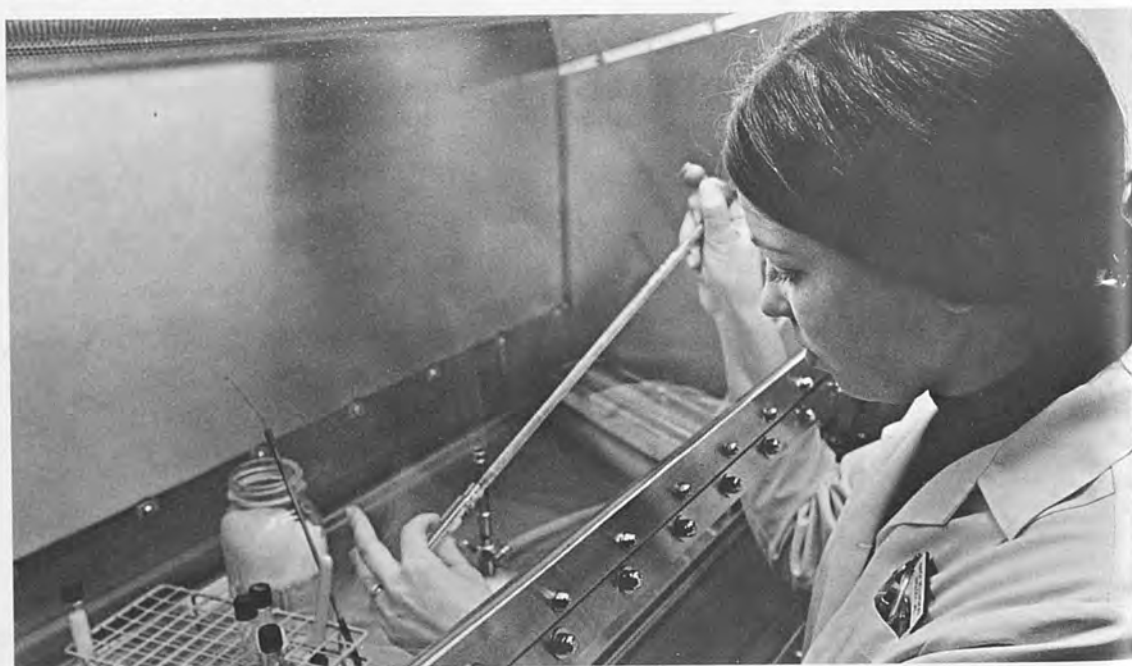
Those departments which offer Postdoctoral Fellowships individualize such educational activity up to a maximum of 36 months of academic time. Such Postdoctoral Fellowships lead integrally to certification by the appropriate specialty and/or subspecialty boards of the American Medical Association. Postdoctoral programs offered by departments of the School and leading to certification by the School are individualized up to a maximum of 36 months of academic time.



Admission

The Washington University School of Medicine selects students on the basis of character, attitude, interest, intellectual ability, motivation, and superior scholastic achievement. Applications are reviewed and independently evaluated by members of the Committee on Admissions. Final decisions are made by the fifteen-member faculty Committee as a whole. All applicants are interviewed prior to their acceptance.

Washington University encourages application from and gives full consideration to all applicants for admission and financial aid without respect to sex, race, color, creed, or national origin. The School is committed to recruiting, enrolling, and educating an increased number of students from Afro-American and other racial-minority and educationally deprived groups.



ENTRANCE REQUIREMENTS

Entrance requirements to the School of Medicine are:

1. evidence of superior intellectual ability and achievement;
2. completion of at least 90 semester hours of college courses in an approved college or university;
3. completion of the Medical College Admission Test of the Association of American Medical Colleges;
4. evidence of character, attitude, and interests suitable for a career in medicine.

Chemistry, physics, and mathematics provide the tools for modern biology, for medicine, and for the biological basis of patient care. Thus, a firm grounding in these subjects is essential for the study of medical sciences. Entering students are expected to have had at least the equivalent of one-year courses at the undergraduate level in physics and biology; to have studied mathematics through integral calculus; and to have a background in chemistry, including organic chemistry. A course in physical chemistry (with calculus as a prerequisite) is strongly recommended. In selected instances, one or more of these prerequisites may be waived by the Committee on Admissions, but applicants are strongly advised to pursue their interests in these and in other areas of science.

A major goal of college should be development of the intellectual talents of the individual. This often involves the pursuit of some area of knowledge in depth, whether in the humanities, social sciences, or natural sciences. At the same time, a diversity of background is encouraged in order to provide a necessary foundation for cultural

development. Specific courses, other than the few in the natural sciences, are not presented as prerequisite because a great variety of courses may prepare the student for the many roles he may play in his medical career.

APPLICATION PROCEDURE

The Washington University School of Medicine participates in the American Medical College Application Service (AMCAS) of the Association of American Medical Colleges. AMCAS is a centralized procedure for applying to any participating medical school with only one application, one Standardized Academic Record, and one set of official transcripts of academic work.

The AMCAS Application for Admission, common to all participating medical schools, is distributed solely by the AMCAS. For this reason, individuals requesting an application and Bulletin from Washington University will receive an AMCAS Application Request Card and a brochure which describes the School of Medicine. The Bulletin is mailed to candidates upon receipt of their application credentials from AMCAS.

Early Decision Admission

This is an optional program for the applicant whose first choice school of medicine is Washington University and who desires an admission decision on his application no later than October 1, 1973. To receive this special consideration, the applicant must agree: (1) to apply only to this School prior to receiving its admission decision; (2) to accept a position in the class if offered; (3) to submit all required credentials by September 1, 1973; and (4) to visit the Medical Center for interviews on a mutually conven-



ient date prior to September 15, 1973. The academic record must show either completion or plans for completion of all courses required for admission, 90 semester hours of course work, and a cumulative grade-point average above 3.50. Medical College Admission Test scores must be above 600. There is no quota on the maximum number of positions in the class of 120 to be filled by Early Decision applicants. The AMCAS Application for Admission contains complete instructions regarding "Early Decision" programs.

Regular Admission

Other than special handling and processing of the Early Decision applicants, all applications for admission to the Washington University School of Medicine are treated initially with equal consideration.

The Committee on Admissions promptly evaluates the AMCAS Application and Standardized Academic Record and advises the applicant whether or not he appears to be competitive for a position in the first-year class. The most highly qualified candidates in the applicant pool are encouraged to complete the required additional credentials. At this stage, a nonrefundable Application Service Fee of \$20 is charged by the University. Selected applicants are strongly encouraged to visit the Washington University Medical Center and to have interviews. Applicants are notified as soon as a final admission decision has been made on their application.

Personal Interview

The Committee on Admissions would like to interview every applicant who passes the initial evaluation screening process, but since this involves several thousand applicants, it is physically impossible to accomplish. Therefore, selected applicants are invited to visit the Washington University Medical Center for an interview, as well as a tour of the School of Medicine and its hospitals. This visit will provide an opportunity for the applicant to meet and talk with students and faculty members.

If an applicant is planning an interview trip which will include the St. Louis area, it is entirely appropriate for him to write the Office of Academic Records and Admissions and inquire if an interview will be requested

of him. The inquiry should be made at least three weeks in advance of the anticipated travel. From September to June, the Office of Admissions is open on week days and until noon on Saturday. During the summer months, the office is closed on Saturday. During November and December, 1973, and January, 1974, members of the Committee on Admissions will visit various parts of the country to interview those selected applicants who are unable to visit the School. However, an on-campus interview in St. Louis is deemed highly preferable.

ADVANCED STANDING

Applicants who have satisfactorily completed one or two years of study toward the M.D. degree at an approved medical school

may be accepted for admission to the second- or third-year class when vacancies exist, provided that

1. they comply with the requirements for admission to the first-year class;
2. they have satisfactorily completed courses equivalent in general content and duration to those in this School in the years for which credit is asked;
3. they pass any examinations required by the Committee on Admissions in subjects already covered.

An applicant for admission to an upper class must have studied as a matriculated medical student in an approved medical school for a period equivalent to that already spent by the class to which admission is sought.



Financial Information

TUITION AND FEES

The University reserves the right to change the fees herein stated at any time without notice. However, if a change is made, it will not become effective until the next academic year.

The following fees are applicable to the 1973-74 academic year:

Application (nonrefundable)	\$ 20
Acceptance Deposit (to reserve a place in class; applied to first-semester tuition; not refundable after March 1 of year in which admission is sought)	\$ 100
Tuition (including health fee)	\$2,750

ESTIMATE OF EXPENSES 1973-74

An estimate of the expenses of a single student is given below. In addition to these expenses, every student is required to have a standard microscope, which may be rented from the School. The microscope rental fee is currently \$90 for the academic year.

Tuition	\$2,750
Books and instruments	\$ 300
Room, board, living expenses	\$2,250

FINANCIAL ASSISTANCE, PRIZES, AWARDS

The ability to finance a medical education at Washington University does not influence the student selection process. At the time accepted students indicate they will matriculate in the School of Medicine, they may request an application for financial aid.

As all students accepted for admission have proven scholastic ability, financial assistance is awarded on a basis of documented finan-



cial need which cannot be met by student and family resources. Many students who consider themselves independent of their parents arrange loans from parents with specific terms of repayment and interest.

The 1974-75 Application for Financial Aid is divided into two portions: Part one, Applicant Data, concerns biographical and financial information on the applicant and spouse (or spouse-to-be). Family Data, the second portion, is sent to the applicant's parents, with the applicant's knowledge, to expedite the processing and to maintain the confidentiality of the information.

The School asks that both portions of the application be returned to the Committee on Student Financial Aid within one week from the date the materials were sent from the School. This schedule allows the Committee to make an award decision normally within two weeks from the date the complete Application for Financial Aid is received. All information is evaluated by the Committee on Student Financial Aid and is held in strict confidence. Awards are in the form of scholarships or grants and loans.

All awards are made for a given academic year; however, students may renew financial assistance in succeeding years of medical school if they remain in good academic and personal standing, and if there is continued financial need. Awards made to a student may vary from year to year, depending upon the student's needs and upon the availability of funds to the Committee. Students are responsible for filing applications for renewal of awards in the spring of each year. Medical students married to schoolmates should submit individual applications, together with financial statements from each student's parents. First- and

second-year students are urged not to accept employment during the academic year. A number of third- and fourth-year students find employment in hospitals within the Medical Center. The Personnel Office provides assistance to students' spouses seeking employment.

The Committee holds that students receiving assistance have an obligation to notify the Committee if their financial situation changes, for example, through employment or receipt of a scholarship not anticipated at the time the application was submitted.

Scholarship Funds

Alexander Berg Research Scholarship. Awarded to students doing summer research in bacteriology.

Gilbert L. Chamberlain, M.D., Scholarship Fund. Created in 1971 by Dr. Gilbert L. Chamberlain to be used to aid worthy students in acquiring their medical education.

The Cecil M. Charles—Nu Sigma Nu Medical Student Scholarship Fund. Established by the Nu Sigma Nu Medical Fraternity in memory of Dr. Charles.

Grace Strong Coburn Scholarship Fund. Created in 1962 through the bequest of Mrs. Grace Strong Coburn for scholarships in the School of Medicine.

The T. Griswold Comstock Scholarships. Established under the will of Marilla E. Comstock for students who would otherwise be unable to obtain a medical education.

The George F. Gill Scholarship Fund. Instituted in memory of a former clinical professor of pediatrics.

Harvielle-Bailey Scholarship. Established in 1970 under the will of Miss Isabel Bailey

26 The School of Medicine

Harvielle as a memorial to Dr. Charles Poplin Harvielle and Dr. Steele Bailey, Jr., alumni of the School.

Health Professions Scholarship Grant. Established by federal legislation to enable students from low income families to undertake the course of study required to become physicians.

Dr. Grace Huse Memorial Fund. Provides scholarship awards for deserving Washington University medical students.

The Insurance Medical Scientist Scholarship Fund. Established for the training of promising scholars intent upon a career in research and academic medicine.

Jackson Johnson Scholarship Fund. Provided through a bequest in 1930 from Jackson Johnson.

George D. Kettelkamp Scholarship Fund. Established in 1969 by Mrs. Kettelkamp in memory of her husband, an alumnus of the School of Medicine.

The Eliza McMillan Scholarship Fund. Provides assistance to young women in any of several schools of the University to secure an education.

Medical Center Alumni Scholarship Fund. Awarded on the basis of academic achievement and financial need.

Roy B. and Viola Miller Memorial Fund. Created in 1963 through the bequest of Roy B. Miller to provide scholarships for medical students and for postgraduate students engaged in study and research in the medical sciences.

Samuel Jennings Roberts Scholarship Fund. Created to provide scholarships for any students engaged in study leading to the degree Doctor of Medicine.

Robert Allen Roblee Scholarship Fund. Established in 1948 through the gift of Mrs. Joseph H. Roblee for students in the School of Medicine.

Thomas W. and Elizabeth J. Rucker Scholarship Fund. Created in 1956 under the will of Eugenia I. Rucker, in memory of her mother and father.

Joseph H. Scharf Scholarship Fund. Provided in 1949 through the bequest of Dr. Joseph H. Scharf.

School of Medicine Scholarship Fund. Created in 1970 to provide financial assistance for medical students.

Dr. John B. Shapleigh Scholarship Fund. Established in 1926 with the bequest of Dr. John B. Shapleigh and supplemented by contributions from Mrs. Shapleigh and Miss Margaret Shapleigh.

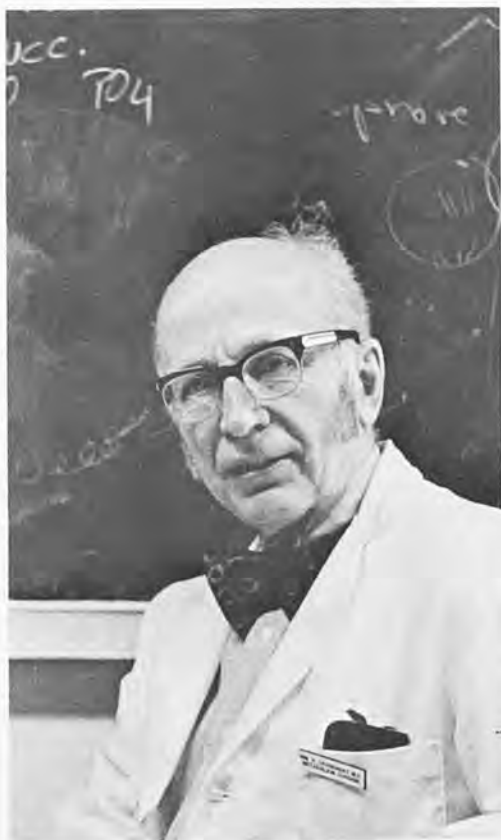
Alexander Balridge Shaw Scholarship Fund. Created in 1958 through the bequest of Roy A. Shaw in memory of his father, Dr. Alexander Balridge Shaw.

Beulah B. Strickling Scholarship Fund. Established in 1960 with a bequest from Mrs. Beulah B. Strickling.

The Marleah Hammond Strominger Scholarship. Established in 1971 by the family and friends of Marleah Hammond Strominger. The recipient shall be a motivated student with need for financial assistance and shall come from a disadvantaged background.

Edwin H. and Virginia M. Terrill Scholarship Fund. Established in 1964 with the bequest of Dr. Edwin H. Terrill, an alumnus. It was Dr. Terrill's hope that scholarship recipients would repay into the Fund the amount of the award.

Hiromu Tsuchiya Scholarship Fund. Created to provide scholarships in the School of Medicine.



Scholarship and Loan Funds

Isabel Vallé Brookings Scholarship and Loan Fund. Established in 1957 by Isabel Vallé Brookings (Mrs. Robert S.) for scholarships and loans in the School of Medicine.

The Danforth Foundation Loan and Scholarship Fund. Provides financial assistance for medical students.

The Danforth Medical Foundation Fund. Created through gifts from the Danforth Foundation and the late William H. Danforth to furnish loans, scholarships, or outright grants to talented and promising young men and women engaged in study or research in basic medical or clinical sciences.

Robert Wood Johnson Foundation Fund. Created in 1972 to provide financial assistance for students who are from rural backgrounds, members of specified minority groups, and women.

William H. and Ella M. Schewe Fund. Established to provide financial assistance to worthy students in the medical school.

School of Medicine Loan and Scholarship Fund. Created in 1970 to provide financial assistance for medical students.

The Wilkinson Scholarship Fund. Created in 1968 by the bequest of Anna J. Wilkinson in honor of her husband, Dr. George E. Wilkinson, medical and postdoctoral students are eligible for Wilkinson scholarships or loans.

Loan Funds

The American Medical Association Loan Program. Makes available bank loans without collateral to eligible medical students, interns, or residents who are citizens of the United States. Applications for such loans are made through the Education and Research Foundation of the American Medical Association.

Health Professions Student Loan Fund. Established by federal legislation for medical students with a demonstrated financial need. Loans are available for long terms at favorable rates.

Ursula Hecker Loan Fund. Established in 1967 by a bequest from Ursula Lee Hecker for the use and benefit of worthy, deserving, and needy medical students.

W. K. Kellogg Foundation Loan Fund. Provides financial assistance to medical students in need of such aid.

Gustel and Edith H. Kiewitt Scholarship Loan Fund. Provides loan funds for medical students.

G. H. Reinhardt Memorial Scholarship Loan Fund. Established in 1947 through the bequest of G. H. Reinhardt.

The Aline Rixman Loan Fund. Created in 1940 by William Rixman in memory of his wife, the fund is used to alleviate unexpected financial emergencies of medical students.

Caroline O. Schlesinger Loan Fund. Established in 1969 to provide financial support for medical students.

FELLOWSHIPS AND OTHER FUNDS

Alexander and Gertrude Berg Fellowship Fund. Created in 1952 through the bequest of Gertrude Berg to provide a fellowship in the Department of Microbiology.

Glover H. Copher Fellow in Surgical Research. Established in 1971 to support a postdoctoral fellow in surgery.

William H. Danforth Loan Fund for Interns and Residents in Surgery. Provides financial assistance in the form of loans for postdoctoral students in surgery.

J. Albert Key Fellowship Fund. Provides a stipend for a fellow in orthopedic surgery.

Ophelia H. Kooden Loan Fund. Created in 1970 to provide loans for medical graduates in memory of Mrs. Kooden's brother, Jess Klement Goldberg.

Louis and Dorothy Kovitz Fellowship in Surgical Research. Established in 1970 by



an alumnus and his wife to encourage medical students to pursue their interest in surgery.

George W. Merck Memorial Loan Fund. Established in 1959 through the Merck Company Foundation to encourage deserving interns and residents to seek the best possible post-doctoral training.

Student Research Fellowships. Awarded each year to students who undertake special research projects under the direction of a faculty member. They carry a stipend. Application should be made to the Committee on Fellowships and Awards, which supervises the program.

AWARDS AND PRIZES

Alpha Omega Alpha Book Prize. Awarded at the end of the fourth year to a member of that class who has performed outstandingly for the entire medical course.

The Jacques J. Bronfenbrenner Prize. Provided by Dr. Bronfenbrenner's students in memory of his inspiration as a teacher and scientist, and awarded to the member of the graduating class who, in the judgment of the Chairman of the Department of Medicine, has done the most outstanding work in infectious diseases or related fields.

Dr. Richard Brookings and Dr. Robert Carter Medical School Prizes. Provided for medical students through a bequest of Robert S. Brookings.

The Kehar S. Chouké Prize. Awarded at the end of the first year to a medical student who has demonstrated superior scholarship in anatomy.

The Carl F. and Gerty T. Cori Prize in Biochemistry. Awarded at the end of the

first year to the member of the class who has demonstrated superior scholarship in biochemistry.

Edmund V. Cowdry Prize in Histology. Established in 1969 to honor Dr. Cowdry; awarded to a freshman medical student who has performed meritoriously in microscopic anatomy.

Antoinette Frances Dames Prize in Physiology and Biophysics. Awarded annually to a member of the first-year class who has demonstrated superior scholarship in these fields.

George F. Gill Prizes. One prize awarded at the end of the first year to a member of the class who has demonstrated superior scholarship in anatomy; one prize awarded to a member of the graduating class who has demonstrated superior scholarship in pediatrics.

Dr. Joseph J. Gitt and Charlotte E. Gitt Prize. Awarded to a senior student for the best original work in the field of clinical and therapeutic medicine.

Dr. Alfred Goldman Book Prize. Created in 1972 as an annual award to be given to a student in the School of Medicine who, in the opinion of the Faculty, has done outstanding clinical or research work in diseases of the chest or pulmonary physiology.

Louis and Dorothy Kovitz Senior Prize in Surgery. Senior award prize in surgery recognizing a member of the senior class who has shown the most outstanding ability, zeal, and interest in surgical problems.

Lange Medical Publications Book Awards. Given to members of all four classes for high scholastic standing and achievement in research.

The Howard A. McCordock Book Prize. Awarded at the end of the second year to a member of that class for general excellence in pathology.

Medical Center Alumni Scholarship Prize. Given annually to a student who has shown excellence in his work during the preceding year.

Medical Fund Society Prizes. One prize awarded annually to a student of the senior class who has excelled in the study of internal medicine; one prize awarded annually to a student of the senior class who has excelled in the study of surgery. No individual is eligible for both prizes.

The Missouri State Medical Association Award. A scroll and a U. S. Savings Bond presented annually to an honor graduate of the senior class.

The C. V. Mosby Company Book Awards. Made to five members of the graduating class for high general scholastic standing and research achievement.

The Roche Award. A scroll and gold wrist-watch presented at the end of the second year to the student who best exemplifies the ideals of the modern American physician.

St. Louis Internists Club Book Prize. Awarded to the graduating senior who has done the most significant research in any area of internal medicine.

St. Louis Pediatric Society Senior Prize. Presented to the senior student showing the greatest promise in clinical pediatrics.

Sandoz Award. Given annually to a graduating student who has made a meritorious contribution to psychiatric research.

The Sidney I. Schwab Book Prizes. Awarded at the end of the fourth year for general excellence in neurology and psychiatry.

Margaret G. Smith Award. Given to a woman medical student for outstanding achievement in the first two years of medical school.

The Samuel D. Soule Award in Obstetrics and Gynecology. Presented to a member of the junior or senior class for meritorious achievement in either basic or clinical investigation in obstetrics and gynecology.

The Upjohn Achievement Award. Given to the senior student who has done the most meritorious work during his medical school career in the field of metabolism.

The Dr. Samson F. Wennerman Prize. Donated by his wife, Zelda E. Wennerman, and awarded annually to that senior student who has demonstrated promise in surgery.

Hugh M. Wilson Award for Meritorious Work in Radiology. Given annually to a graduating medical student in recognition of outstanding work in radiology-related subjects, either clinical or basic science.





The James Henry Yalem Prize in Dermatology. Established by Charles Yalem in memory of his son and awarded annually to a member of the senior class for outstanding work in dermatology.

AIDS IN ALLIED HEALTH PROFESSIONS

Frank R. Bradley Scholarship Loan Fund. Established in 1958 by the Alumni Association of the Graduate Program in Health Care Administration as a loan fund in honor of Dr. Frank R. Bradley.

W. K. Kellogg Foundation Loan Fund for Graduate Students in Hospital Administration. Established in 1958 and supplemented in 1964.

Mary A. Lennon Memorial Scholarship Loan Fund in Health Care Administration. Established in 1958 by Mrs. Maureen Lennon Callaghan and Lieutenant Colonel Donald E. Callaghan to provide loans for students in the Graduate Program in Health Care Administration.

Washington University Health Care Administration Scholarship Fund. Started in 1968 to provide help on the basis of need without interest or expectation of repayment.

Foster G. McGaw Scholarship Fund. Awarded to two students entering the Graduate Program in Health Care Administration. Selection is based on financial need and potential for contribution to the profession.

Bertha Reinhardt Green Memorial Fund. Created in 1954 by a bequest from Bertha Reinhardt Green as a loan fund for students enrolled in the Program in Occupational Therapy.

W. K. Kellogg Foundation Loan Fund for Students in Physical Therapy. Created in 1943 for students in the Program in Physical Therapy.

Gustel and Edith A. Kiewitt Scholarship Loan Fund. Provides loan funds for students in Physical and Occupational Therapy.

Student Life

HOUSING

The Off-Campus Housing Office in Karl Umrath Hall on the hilltop campus maintains listings of housing appropriate for married and single students.

The Spencer T. Olin Residence Hall has accommodations for approximately 300 single men and women. This building, made possible by generous gifts from Spencer T. Olin and alumni and friends of the School of Medicine, is located at 4550 Scott Avenue in the Medical Center. Olin Hall is planned for the convenience of students in the medical or paramedical sciences. Every effort is made to provide an atmosphere that not only aids him in meeting his study obligations, but also recognizes his privileges as a graduate student.

The rates for rooms during 1973-74 are:

School year: September to June (9 months)

\$610 per student in 2-room suite
(2 students per suite)

550 per student in single room

465 per student in double room

Summer: For Three Months

\$205 per student in 2-room suite

185 per student in single room

155 per student in double room

Summer: Weekly Rates

\$15.75 per student in 2-room suite

14.25 per student in single room

12.00 per student in double room

Daily Rates for Visitors

\$8.00 per person in 2-room suite

7.00 per person in single room

5.00 per person if prospective student



Each occupant is required to pay a \$25 security fee in addition to the room rental charge. This fee will be held by the University until termination of residence to cover losses resulting from possible damage to the room or the furniture. Any portion not so used will be refunded.

PARKING

Parking is available on a lot behind Olin Hall and in other lots located near to and operated by the School of Medicine. A monthly or annual permit must be purchased.

STUDENT HEALTH SERVICE

Entering students are given a complete medical examination and are provided with medical care as long as they are enrolled in the School of Medicine. Physicians are available at the Student Health Service, and a physician is on call for emergency care at Barnes Hospital or in the student's room when necessary. Essential costs of hospitalization are covered through a liberal group insurance policy. The student or his family is responsible for meeting the costs of hospital care in excess of those paid by this policy. The responsibility of the Student Health Service for hospitalization costs will end thirty days after a hospitalized individual ceases to be an officially enrolled student. Except in certain emergencies, costs will not be covered for outpatient care that is not arranged through the Student Health Service.

RECREATIONAL AND CULTURAL OPPORTUNITIES

The City of St. Louis offers many cultural and recreational facilities, among which are

Forest Park with its lagoons, sports areas, and the Zoo; the City Art Museum; the Museum of the Missouri Historical Society; and the McDonnell Planetarium. The St. Louis Symphony Orchestra presents a series of concerts during the season, and the Municipal Opera stages musicals in an outdoor theater during the summer. One of the country's most notable horticultural gardens, the Missouri Botanical Garden, is located in St. Louis.

Professional sports are an important part of the St. Louis scene. The football and baseball Cardinals play in the handsome Busch Stadium downtown, and the St. Louis Blues hockey team plays at the Arena, not far from the School.

Within the University community excellent concerts, theater, lectures, and other cultural activities are open to students in the School of Medicine. Facilities for indoor and outdoor sports, including tennis courts and the Wilson Pool, are available on the hilltop campus. Olin Residence Hall contains an excellent full-sized gymnasium for student use.

STUDENT ACTIVITIES

Senior Research Assembly. In the spring of each year, the Senior Research Assembly is held for the purpose of enabling senior students to report on original research completed at any time during their four years in the School.

Graham Colloquium. A gift from Mr. and Mrs. Evarts Graham, Jr., in 1963 enabled the School to establish a series of informal discussions led by outstanding scholars from fields other than medicine and the biological sciences. Mr. and Mrs. Graham's pur-



Pruitt-Igoe Medical Action Program. Medical students and faculty members working closely with members of the community have established a small outpatient clinic at Pruitt-Igoe, an inner-city, high-rise, public housing project. The facilities are open to patients every evening, Monday through Friday. Medical teams on duty consist of medical students under the supervision of a physician. Their responsibilities include primary care, triage, referral to appropriate health units in the City, and follow-up care.

WASHINGTON UNIVERSITY MEDICAL CENTER ALUMNI ASSOCIATION

The Washington University Medical Center Alumni Association plays a significant part in the life of the School. It was organized to promote a spirit of class fellowship among its members, to further the aims and purposes of the School, and to stimulate interest in the advancement of medical and collateral sciences.

Membership is made up of all graduates of the School of Medicine, all members of the faculty, and all former house officers of the Medical Center. Each year the Association gives a welcoming party for the incoming freshman class and, prior to Commencement on Alumni Day, sponsors the annual alumni banquet at which graduating seniors are guests. The Alumni Day reunion features a scientific program presented by graduates and faculty members and a buffet luncheon at which the alumni and senior students are guests of the School of Medicine and its faculty.

The Alumni Office prepares and distributes a schedule of departmental teaching con-



pose was concordant with that of the School: to encourage opportunities for students to expand their views on social, philosophical, artistic, and political topics. The Graham Colloquia guests, selected by the students, are planned to foster an informal, lively exchange of views.

ferences held each week in the Medical Center and open to physician attendance.

LECTURESHIPS AND VISITING PROFESSORSHIPS

Several established lectures enable the School to bring to the Medical Center each year distinguished guests who contribute significantly to the richness of student life.

Harry Alexander Visiting Professorship. Established by former house officers and friends of Dr. Harry Alexander to provide an annual visiting professor in the Department of Medicine.

Alpha Omega Alpha Lectureship. Given each year by a faculty member of the students' selection.

George H. Bishop Lectureship. Supported by funds made available by friends interested in the advancement of neurology.

The James Barrett Brown Visiting Professorship in Plastic and Reconstructive Surgery. Created by patients, friends, colleagues, and former students to honor Dr. Brown.

The Thomas H. Burford Lectureship in Thoracic Surgery. Founded in 1971 by friends of Dr. Burford.

Glover H. Copher Lectureship in Cancer. Founded in 1971 with endowment provided by Dr. Copher and friends.

Joseph J. Gitt Visiting Professorship in Clinical Neurology. Established in 1971 by his family and friends to honor Dr. Gitt.

Evarts A. Graham Memorial Lectureship. Established with a reserve fund left by Dr. Graham for his successors.

Evarts A. Graham Visiting Professorship of Surgery. Established by the Harry Freund Memorial Foundation to support an annual lecture in honor of Dr. Graham's contributions to surgery.

Samuel B. Grant Visiting Professorship. Created to provide annually a visiting professor in the Department of Medicine.

Alexis F. Hartmann, Sr., Lectureship. Established by friends interested in pediatrics to provide an annual lecture in Dr. Hartmann's honor.

H. Relton McCarroll, Sr., Visiting Professorship in Orthopedic Surgery. Created by patients, friends, colleagues, and former students in honor of Dr. McCarroll.

Carl V. Moore Lectureship. Established by friends and patients of Dr. Carl V. Moore.

Wendell G. Scott Memorial Lectureship. Established in 1972 by friends and colleagues of Dr. Wendell G. Scott.

Major G. Seelig Lectureship. Established in the field of surgery by friends of Dr. and Mrs. Seelig.

Philip A. Shaffer Lectureship. Founded by friends of Dr. Shaffer in recognition of his accomplishments in biochemistry.

St. Louis Football Cardinals Visiting Professorship in Orthopedic Surgery. Made possible by a donation from the St. Louis Football Cardinals.

Robert J. Terry Lectureship. Established by alumni "for the purpose of fostering greater appreciation of the study of human anatomy."

Teaching Facilities

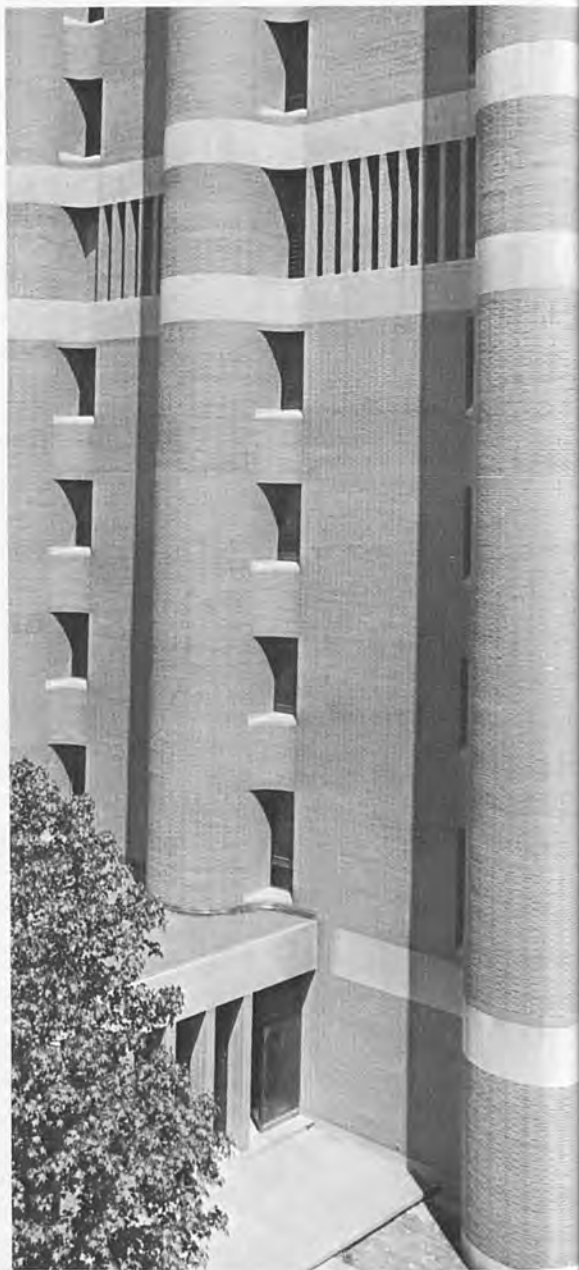
WASHINGTON UNIVERSITY AND THE SCHOOL OF MEDICINE

The Washington University School of Medicine is located along the eastern edge of Forest Park in St. Louis' West End. Along the western edge of Forest Park is the main campus of the University.

As the scope of scientific and humane scholarship was expanded, the resources of the University have greatly enriched the educational opportunities available to individuals interested in medical and paramedical fields. A regularly scheduled shuttle bus, operated for the benefit of students and faculty, brings the two campuses within ten minutes of each other.

The McDonnell Medical Sciences Building, dedicated in the fall of 1970, is the principal focus of activity for entering medical students. Rising nine floors above ground, it contains administrative offices and two lecture halls on the first floor. Multidisciplinary teaching laboratories for first- and second-year students, and offices and research laboratories for the six existing basic science departments, as well as for the anticipated Department of Genetics, are located on upper floors. Modern, centralized animal quarters are housed in the basement.

The older structures—the West, North, and South buildings, in which centered the work of several Nobel Laureates—have been extensively renovated. Along with the Cancer Research Building, they will continue to provide space for laboratories, offices, the library, and some departmental facilities.



BIOMEDICAL COMPUTER LABORATORY

An outstanding group of computer scientists and engineers and their students are engaged in studying the use of computers as applied to biomedical problems.

The Biomedical Computer Laboratory and the Computer Systems Laboratory are located in adjoining buildings at 700 and 724 South Euclid, which also house the Division of Biostatistics of the Department of Preventive Medicine and Public Health.

THE LIBRARY

The School of Medicine Library is one of the largest medical libraries in the Midwest. It contains a collection of more than 130,000 volumes and subscribes to more than 2,200 serials. Special holdings include a rare book collection, the School's historical archives, memorabilia, and manuscript copies of the scientific papers of such outstanding men of medicine as Doctors William Beaumont, Joseph Erlanger, E. V. Cowdry, Evarts Graham, Leo Loeb, Philip Shaffer, and Robert J. Terry.

A *Catalog of Books*, which is an index to its book holdings, is cumulated, published annually on microfiche, and distributed to each medical department. It produces computer-based lists of its journals and similar lists for a number of biomedically oriented medical school libraries in the United States. The Library provides services to hospitals represented in the library project of the Bi-State Regional Medical Program, and is deeply involved in the Mid-Continental Regional Medical Library (National Library of Medicine).

Library hours are 8:30 a.m. to 12 midnight

on weekdays; 8:30 a.m. to 6:00 p.m. on Saturdays; and 1:00 p.m. to 10:00 p.m. on Sundays. A student reading room is open twenty-four hours a day. In the summer and on holidays special hours are maintained.

THE MEDICAL CENTER, ITS HOSPITALS AND INSTITUTES

While the School of Medicine, from its beginnings, has maintained an association with local teaching hospitals, it was not until 1962 that the affiliated institutions were incorporated to form a central organization now known as the Washington University Medical Center. Thus, the present Medical Center is a federation of several institutions owned by the University and five institutions owned independently. Students receive clinical instruction and gain experience in all divisions of the Medical Center.

The Barnes Group. Barnes Hospital is the largest hospital in the Medical Center. It is independently owned but, through a special agreement, operates all the hospitals and clinics owned by the University. These contiguous facilities provide the chief source of clinical experience for medical students. The original hospital contained 150 beds; the Group now has a capacity of approximately 1,115 beds—teaching facilities for all clinical departments except Pediatrics. All activities of the School of Medicine and the Barnes Group are closely integrated, and the hospital staffs are composed exclusively of members of the Faculty of Medicine. The eighteen-story Queeny Tower has five nursing floors and two self-care floors, plus five floors of doctors' offices. A large central diagnostic laboratory provides modern diagnostic patient services.

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The *East Pavilion* is a fourteen-story inpatient hospital owned jointly by Barnes Hospital and Washington University. This multidisciplinary patient-care center contains 64 private and 200 semi-private rooms, five intensive care units, obstetrical delivery suites, and 22 operating rooms for neurosurgery, ophthalmology, otolaryngology, and gynecology.

Facilities owned by Washington University and operated by Barnes Hospital are as follows:

McMillan Hospital houses offices and research laboratories for the departments of Neurology, Ophthalmology, and Otolaryngology.

Renard Hospital provides 104 beds for patients with psychiatric disorders, and affords laboratories and offices for the Department of Psychiatry.

St. Louis Maternity Hospital houses offices and research laboratories for the Department of Obstetrics and Gynecology. A new Perinatal Center and laboratories for research in the physiology of reproduction are planned for this building.

David P. Wohl, Jr., Memorial Hospital, opened in 1953, contains facilities for 84 medical and surgical patients. Offices and laboratories for the departments of Medicine and Surgery are also situated in Wohl Hospital.

David P. Wohl, Jr., Memorial-Washington University Clinics handle about 100,000 outpatient visits a year. Five floors of the building are devoted to the Clinics and five floors to research, including the Division of Health Care Research.

Other facilities owned by Washington University are:

William Greenleaf Eliot Division of Child Psychiatry. The Division conducts an advanced teaching program in child psychiatry and is the focus for research and treatment in child psychiatry.

Edward Mallinckrodt Institute of Radiology, one of the largest and best equipped in the world, houses the diagnostic, therapeutic, and research activities of the Department of Radiology. It is connected on most of its floors with the adjoining Barnes and Barnard hospitals, and through them with other hospitals of the group, thus providing easy access for all inpatients.

Irene Walter Johnson Institute of Rehabilitation is a center for training personnel in rehabilitation procedures, for treatment of disabled persons in the St. Louis metropolitan area, and for research related to chronic diseases.

Oscar Johnson Institute for Medical Research. Occupying the top five floors of the McMillan Hospital, it provides office space and research facilities for the departments of Neurology, Ophthalmology, and Otolaryngology.

Other institutions formally associated with the Medical Center are:

Barnard Free Skin and Cancer Hospital is independently owned but is operated by Barnes Hospital. It is a 44-bed hospital for the care and treatment of patients who suffer from skin diseases and cancer or who are undergoing special tests in the Clinical Research Center.

St. Louis Children's Hospital. From its earliest days, the Children's Hospital, gov-

erned by its own directors, has been an integral part of the Medical Center and a leader in the development of academic pediatrics. All professional staff are members of the Faculty of Medicine, and the medical director is also professor and head of the Department of Pediatrics at Washington University. Considerable clinical service and research are conducted at Children's. Of particular interest is the recently created Ranken-Jordan Center for Metabolic Diseases.

Jewish Hospital of St. Louis contains 506 beds. Its departments represent each of the major specialties except pediatrics. The Aaron Waldheim Outpatient Clinics provide all facets of health care to the community, while the Yalem Research Building contains important research facilities for the Hospital and School of Medicine.

Central Institute for the Deaf. This nationally known institution provides facilities for research into hearing problems, maintains a school for deaf and speech-handicapped children, provides outpatient clinics for children and adults, and engages in a program of professional education for scholars in the fields of audiology and otolaryngology.

OTHER INSTITUTIONS

In addition to the above facilities which make up the Washington University Medical Center proper, the following hospitals are affiliated with the School of Medicine, and various members of the staffs hold University appointments.

The four City hospitals:

Max C. Starkloff Hospital, with 550 beds.

Homer G. Phillips Hospital, with 466 beds.

Robert Koch Hospital, with 735 beds.

St. Louis Chronic Hospital and Nursing Home, with 550 beds.

Malcolm Bliss Mental Health Center, with 250 beds.

Ellis Fischel State Cancer Hospital, Columbia, Missouri, with 104 beds.

St. Louis Veterans Administration Hospitals, with 1,137 beds.

St. Louis County Hospital, with 300 beds.

St. Louis Shriners Hospital for Crippled Children, with 100 beds.

St. Louis State Hospital, with 1,429 beds.

St. Luke's Hospital, with 389 beds.



Departments
of the
School of Medicine





Department of Anatomy

The anatomical sciences are presented in three required courses: gross anatomy, offered in the first semester; and microscopic anatomy and neuroanatomy, taught in the second semester. The course in neuroanatomy is taught conjointly with the Department of Physiology and Biophysics. In addition, the Department offers a series of graduate courses which may be taken as electives by senior students. Gross anatomy is taught essentially as a laboratory course, but with some lectures dealing with anatomical principles and with human growth and development. The course in microscopic anatomy consists largely of cell and tissue biology, with laboratory sessions paralleling the lectures in these areas. Neuroanatomy is taught mainly from an experimental point of view, with particular emphasis upon the development and structure of the neural tissues. Throughout all three courses, attention is paid to the results of recent investigations and to major developments in each field. The Department is well equipped for special work in several areas, including gross anatomy, electron microscopy, tissue culture, neuroanatomy, cell biology, and developmental and reproductive biology.

FIRST YEAR

501. *Gross Anatomy.* The course is based on dissection of the human body. An extensive collection of dissected specimens is housed in the dissecting rooms so that students may easily compare their dissections with museum specimens. X-ray films are used to complement the current dissections; cineradiographs are presented regularly. Fresh organs are provided for demonstration and dissection at appropriate times. Occasional attendance at autopsies is rec-



ommended. Frequent discussions are held with small groups of students. Credit 6 units.

504. *Neural Sciences.* This course, which is taught conjointly by the Departments of Anatomy and Physiology and Biophysics, provides a broad introduction to modern neurobiology. The neuroanatomical aspects of the course deal primarily with the tissues of the central nervous system from an experimental point of view. The course occupies approximately one and one-half days a week throughout the second semester. Credit 5 units.

506. *Microscopic Anatomy.* The structure of cells, tissues, and organs is studied with regard to the functional significance of the morphological features. The laboratories

consist of the study of prepared slides, of preparations of fresh tissues, and of electron micrographs. Each student is required to rent a microscope from the School or have his own. Credit 4 units.

In addition to the above required courses, the Department offers a number of graduate-level courses which may be taken as electives by medical students. These include:

Fall Semester

581 ~~503.~~ ^{Experimental Neuroanatomy I} ~~Experimental Neuroanatomy.~~ An introduction to the modern techniques used in the analysis of neural systems and fiber pathways, together with a consideration of certain of the major fiber systems of the brain and spinal cord. Prerequisite, Anatomy 504 or consent of instructor. Credit 2 units.

509. *Oral Histology.* Microscopic structure and functional significance of the teeth, supporting structures, and other oral organs. Includes embryonic development. Credit 2 units.

510. *Special Anatomy of the Head and Neck.* Lectures and dissection, with particular emphasis on the face and oral structures. Credit 3 units.

512. *Biology of Cultured Cells.* Lectures and laboratory experiments dealing with metabolism, growth, and differentiation of cells grown *in vitro*. Established cell lines, primary cultures, and organ cultures will be used to investigate basic problems in cell biology. Prerequisite, Biochemistry 503 or 504 or consent of instructor. Credit 2 units.

513. *Neurocytology.* A consideration at the light and electron microscopical levels of

neural tissue, including neurons and their processes, synapses, glial cells, myelin, etc., and their reaction to experimental injury. Lectures and laboratory. Prerequisite, Anatomy 504 or consent of instructor. Credit 2 units.

515. *Functional Anatomy of the Mammalian Integument.* A light and electron microscopical survey of the skin, including hair and cutaneous glands. Particular emphasis will be given to the epidermis and its functional role as a water barrier. Prerequisite, Anatomy 506 or consent of instructor. Credit 1 unit.

519. *Developmental Anatomy.* Seminars and laboratories dealing with various aspects of organogenesis in mammalian embryos. Normally to be taken in conjunction with Anatomy 501, this course provides a series of lectures on human embryology, dealing particularly with the development of organ systems. By permission of instructor a student may take the lectures only of Anatomy 501 and receive 1 unit additional credit. Credit 2 or 3 units.

520. *Early Mammalian Development.* Seminar dealing with fertilization, cleavage, blastocyst formation, and implantation. Prerequisite, Anatomy 506 or 519 or consent of instructor. Offered in even-numbered years. Credit 2 units.

521. *Intrauterine Development.* Lecture and discussion on the structure and function of the mammalian placenta, maternal-fetal exchange of gases and metabolites, immunological development of the fetus, hormone metabolism in the fetal-placental unit, and abnormal trophoblastic growth. Prerequisite, Anatomy 506 or 519 or consent of instructor. Offered in odd-numbered years. Credit 2 units.

Spring Semester

502. History of Anatomy. Seminar on historical problems in anatomy. Credit 2 units.

511. Human Growth and Development. Principles and patterns of postnatal growth and development. Dissection and discussions. Prerequisite, Anatomy 501 or 506 and 519 or consent of instructor. Credit 3 units.

Bio 428 **514. Developmental Neurobiology.** A survey of the major features of neuroembryology (induction of neural tissue, cell proliferation, migration, and specification) and the contributions of tissue culture (cellular and organotypic) to the understanding of neural development. Lectures and laboratory. Credit 2 units.

590. Research opportunities are offered in the following areas:

Neural growth and development.

(Dr. Cowan)

The history of medicine. (Dr. Brodman)

The growth and maturation of neural tissue *in vitro*. (Dr. R. Bunge)

The fine structure of the retina. (Dr. Cohen)

The mechanism of implantation. (Dr. Enders)

Postnatal growth and development. (Dr. Peterson)

Cell growth and radiation effects. (Dr. Tolmach)

The cytology of neural tissues. (Dr. M. Bunge)

Growth and differentiation of neuroblastoma and other cultured cell lines.

(Dr. Goldstein)

The anatomy of the somatosensory and auditory systems. (Dr. Jones)

The anatomy & physiology of the cerebellum (Dr. Thach)

The cell cycle and cellular differentiation.

Cutaneous (especially hand) (Dr. Bischoff)

Thermal/sensibility. (Dr. Burton)

Retinal growth and specification.

(Dr. Kahn)

The transport of materials across the placenta. (Dr. King)

The structure and function of the skin.

(Dr. Menton)

The organization of the olfactory system.

(Dr. Price)

The organization of the somatosensory cortex. (Dr. Woolsey)

Axoplasmic transport (Dr. Weisner)

Note—The number preceding the course title indicates that the course carries credit in the Graduate School of Arts and Sciences.

Professor and Head of the Department

W. Maxwell Cowan, B.Sc. (hon.), Witwatersrand University, 1952; Ph.D., Oxford University, 1956; M.B.B.Ch., 1958.

Professors Emeriti

~~Walter P. Covell, B.S., Oregon State College, 1921; M.S., 1923; Ph.D., University of Minnesota, 1926; M.D., University of Chicago, 1933. (See Department of Otolaryngology)~~

Mildred Trotter, A.B., Mount Holyoke College, 1920; Sc.M., Washington University, 1921; Ph.D., 1924; Sc.D. (hon.), Western College, 1956; Sc.D. (hon.), Mount Holyoke College, 1960. (See Department of Radiology) (Also Lecturer)

Professors

Estelle Brodman (Medical History in Anatomy), A.B., Cornell University, 1935; B.S., Columbia University, 1936; M.S., 1943; Ph.D., 1953.

Richard P. Bunge, B.A., University of Wisconsin, 1954; M.S., 1956; M.D., 1960.

Adolph I. Cohen, B.S., City College of New York, 1948; M.A., Columbia University, 1950; Ph.D., 1954. (See Department of Ophthalmology)

Allen C. Enders, A.B., Swarthmore College, 1950; A.M., Harvard University, 1952; Ph.D., 1955. (See Department of Pathology)

Roy R. Peterson, A.B., University of Kansas, 1948; Ph.D., 1952.

Leonard J. Tolmach, B.S., University of Michigan, 1943; Ph.D., University of Chicago, 1951. (See Department of Radiology)

~~Richard Torack, B.S., Seton Hall University, 1948; M.D., Georgetown University, 1952. (See Department of Pathology)~~

Research Professor Emeritus

Edmund V. Cowdry, A.B., University of Toronto, 1909; Ph.D., University of Chicago, 1912.

Research Professor

Donald F. Wann, B.E., Yale University, 1953; M.S., Washington University, 1957; D.Sc., 1961. (Also School of Engineering and Applied Science)

Associate Professors

Milton N. Goldstein, B.S., Western Reserve University, 1946; M.S., 1947; Ph.D., 1952. (See Department of Pathology)

Edward G. Jones, M.B., Ch.B., University of Otago, 1962; Ph.D., Oxford University, 1968; M.D., University of Otago, 1970.

~~Joseph R. Williamson, A.B., Phillips University, 1954; M.D., Washington University, 1958. (See Department of Pathology)~~

Add Thach

Research Associate Professor Emeritus

Valentina Suntzeff, M.D., Women's Medical Institute (Russia), 1917. (Also Lecturer, Cancer Research)

Research Associate Professor

Mary B. Bunge, B.S., Simmons College, 1953; M.S., University of Wisconsin, 1955; Ph.D., 1960.

Assistant Professors

E. Richard Bischoff, A.B., Knox College, 1960; Ph.D., Washington University, 1966.

Harold Burton, B.A., University of Michigan, 1964; Ph.D., University of Wisconsin, 1968. (See Department of Physiology and Biophysics)

Joseph Hanaway, B.A., McGill University, 1956; M.D., 1960; C.M., 1960. (See Department of Neurology)

Joseph E. Harvey, B.A., University of California, Berkeley, 1954; M.A., 1964; Ph.D., 1968. (See Department of Otolaryngology)

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Arnold J. Kahn, B.A., University of Louisville, 1957; M.S., 1958; Ph.D., Columbia University, 1962.

Barry F. King, B.A., University of Minnesota, 1965; M.A., University of Nevada, 1967; Ph.D., Washington University, 1970.

Peregrina N. C. Labay, B.S.Ed., University of St. Thomas (Virgin Islands), 1947; B.S. in Med., 1949; M.D., 1954. (See Department of Surgery)

Lorraine F. Lake, B.S., Washington University, 1950; M.A., 1954; Ph.D., 1962. (See Irene Walter Johnson Institute of Rehabilitation, Physical Therapy, and Department of Preventive Medicine and Public Health)

David N. Menton, B.S., Mankato State College, 1959; Ph.D., Brown University, 1966. (See Department of Pathology)

Joseph L. Price, B.A., University of the South, 1963; Ph.D., Oxford University, 1969.

Thomas A. Woolsey, B.S., University of Wisconsin, 1952; M.D., Johns Hopkins University, 1969.

Research Assistant Professors

~~Stephanie C. Phillips, B.S., University of Chicago, 1964; M.S., 1967; Ph.D., 1968.~~

Sandra J. Schlafke, B.A., Rice University, 1959; M.A., 1962.

Research Instructors

~~David I. Gottlieb, A.B., Harpur College, 1964; M.A., University of Wisconsin, 1969; Ph.D., Washington University, 1971.~~

~~Judith Medoff, B.A., Barnard College, 1960; M.A., Washington University, 1962; Ph.D., Brandeis University, 1966.~~

Mary Olson ?

Research Assistants

Oliver H. Duggins, B.S., Northwestern University, 1934; M.S., 1936; Ph.D., Washington University, 1953.

Paul R. Myers, A.A.S., M.T. (A.S.C.P.), Rochester Institute of Technology, 1957.

Rosemary P. Rees, B.Sc., University of Sydney, 1966.

Lynn A. Rogers, B.A., Augustana College, 1967; M.A., Washington University, 1972.

~~Bratin Saha, B.S., University of Calcutta (India), 1963; M.S., 1965; M.S., University of Michigan, 1968; Ph.D., St. Louis University, 1972.~~

Alice R. Schlessinger, B.A., Brooklyn College, 1956; M.S., Cornell University, 1958.

Patrick M. Wood, A.B., Centre College of Kentucky, 1961; M.S., Purdue University, 1965; Ph.D., 1968.



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Department of Anesthesiology



According to the American Board of Anesthesiology, this specialty may be described as a practice of medicine which encompasses: (1) the management of procedures for rendering a patient insensible to pain during surgical procedures; (2) the support of life functions under the stress of anesthetic and surgical manipulations; (3) the clinical management of the patient, unconscious from whatever cause; (4) the management of problems in pain relief; (5) the management of problems in cardiac and respiratory resuscitation; (6) the application of specific methods of inhalational therapy; and (7) the clinical management of various fluid, electrolyte, and metabolic disturbances.

With these objectives in mind, this Department is dedicated to presenting to the student, as opportunities develop: (1) clinical applications of certain anatomic relationships, e.g., regional nerve blocks; (2) applications of principles of respiratory physiology, e.g., mechanics of ventilation under various circumstances, cardiorespiratory resuscitation; (3) application of pharmacologic knowledge related to sedative, narcotic, and anesthetic drugs, and to compounds affecting the autonomic nervous system; (4) clinical problems related to acid-base, fluid, and electrolyte balance in surgical patients; and (5) principles underlying the approaches to the emerging concept of "acute medicine."

Between the second and third years of medical school, preceptorships in anesthesiology are available for eight-week periods by individual application. Each preceptee is assigned to a staff anesthesiologist and gains experience in the performance of clinical anesthesia, participates in conferences and seminars, and joins in ward rounds in the recovery room and intensive care unit.

An elective in clinical anesthesiology is offered every six weeks for eight students. The pharmacology of inhalation, intravenous, and local anesthetic drugs is demonstrated by practical application by the student in the operating room. The importance of blood gas determinations in evaluating the efficacy of ventilation is shown.

Opportunities to develop proficiency in techniques such as endotracheal intubation are available. Special sessions on cardiopulmonary resuscitation are conducted and students are expected to attend the regular anesthesia conferences and seminars.

Henry E. Mallinckrodt Professor of Anesthesiology and Head of the Department

C. Ronald Stephen, B.Sc., McGill University (Canada), 1938; M.D., C.M., 1940.

Professor

Leonard W. Fabian, B.S., University of Arkansas, 1951; M.D., 1951.

Research Professor

Albert Roos, M.D., University of Groningen (Holland), 1940. (See Department of Physiology and Biophysics)

Associate Professors

James D. Jones II, B.S., Louisiana State University, 1940; D.D.S., Loyola University of the South, 1945; M.D., University of Alabama, 1957.

Robert N. Miller, A.B., University of Missouri, 1957; M.D., 1961. (See Department of Pharmacology)

Assistant Professors

Donald J. Dickler, B.A., New York University, 1942; M.D., 1945. (Jewish Hospital)

James A. Felts, B.S., DePauw University, 1943; M.D., Northwestern University, 1946.

Bela I. Hatfalvi, M.D., M.Kir.Tisza Istvan Tudományegyetem (Hungary), 1938.

Sara T. Jones, B.A., University of North Carolina, 1958; M.D., Bowman Gray School of Medicine, 1962.

Lewis J. Thomas, Jr., B.S., Haverford College, 1953; M.D., Washington University, 1957. (See Department of Physiology and Biophysics and Biomedical Computer Laboratory)

Robert W. Vaughan, B.S., Southern Methodist University, 1962; M.D., University of Texas (Southwestern) Medical School, 1966.

Glenn R. Weygandt, M.D., Washington University, 1947.

Instructors

Louise S. Grove, R.N., CRNA, Barnes Hospital, 1960.

Dean E. Hayden, R.N., CRNA, Barnes Hospital, 1940.

Robert B. Holloway, B.S., Le Moyne College, 1952; M.D., Meharry Medical College, 1956. (St. Louis V.A. Hospitals)

A. Ercument Kopman, M.D., Istanbul University, 1947.

Elsie F. Meyers, B.A., Indiana University, 1947; M.D., 1950.

Irvin C. Susman, M.D., University of Illinois, 1949. (Jewish Hospital)

Somporn Nukrongsin, M.D., Siriraj Hospital, University of Medical Sciences (Thailand), 1963. (Jewish Hospital)

Herminia D. Vjungco, M.D., University of Santo Thomas (Philippines), 1965. (Jewish Hospital)

Instructors (Clinical)

Sedat M. Ayata, B.S., Istanbul Lyceum, 1949; M.D., University of Istanbul, 1955.

Charles R. Blackwell, M.D., Meharry Medical College, 1965.

Francis G. Duffy, M.D., B.Ch., B.A.O., University College of Dublin, 1951.

Paul L. Friedman, A.B., Washington University, 1953; M.D., 1957.

Hugh F. S. Keister, A.B., Washington University, 1955; M.D., 1959.

George E. Lucas, B.S., John Carroll University, 1953; M.D., St. Louis University, 1958.

Daniel W. Platt, M.D., Chicago Medical College, 1949.

William A. Sims, Jr., A.B., University of Missouri, 1954; B.S. Med., 1955; M.D., Washington University, 1957.

Fellow

Silamsetti Rangamannar, M.B.B.S., Andhra University (India), 1958.



Department of Biological Chemistry

The Department offers a general introductory course, an advanced course relating the subject to biology and medicine, and several specialized courses in the major aspects of biochemistry. Students of medicine and in the Graduate School of Arts and Sciences may enroll in the courses or pursue research work under the direction of the staff. Facilities in research are provided in carbohydrate, lipid, nucleic acid, protein, and steroid biochemistry, with varying emphasis on enzymology, metabolism, physical chemistry, structural studies, or biochemical genetics. Some summer research fellowships are offered to students of medicine.

FIRST YEAR

503. *Biological Chemistry.* Lectures, conferences, and laboratory work for students without sufficient background in biochemistry. First semester, 216 hours. Lectures only, credit 4 units; laboratory work for graduate students only by permission of the Department, credit to be arranged.

504. *Advanced Biological Chemistry.* Lectures for students with appropriate background in biological chemistry. Special emphasis on the subject as it relates to important aspects of biology and medicine. First semester. Lectures only, credit 4 units.

Elective Courses

505. *Proteins and Enzymes.* Discussion of the chemistry of amino acids, peptides, and proteins, with emphasis on those aspects contributing to their three-dimensional structure. Development of enzyme kinetic theory, including current concepts of regulatory enzymes. Specific enzymes and classes of enzymes are discussed with respect to the correlation of their kinetic and molecular



properties and the overall chemical mechanism of the catalytic reaction. Four class hours a week. Credit 4 units.

508. *Membrane Chemistry, Structure and Function.* Chemistry and physical chemistry of membrane components. Membrane structure as related to cell permeability, active

transport, and synthesis of the bacterial cell wall. Three class hours a week. Credit 3 units.

512. *Digital Computers for Laboratory Use.* Methods of using small digital computers with laboratory instruments. Basic programming, data collection and conversion, data processing, digital control, output techniques. Calculus is desirable. Three class hours and one laboratory period a week. Credit 4 units. (Dr. Holmes)

513. *Nucleic Acids and the Biosynthesis of Proteins.* Mechanism of the biosynthesis of nucleic acids and proteins is emphasized. Specialized aspects in higher organisms are considered. Credit 3 units.

515. *Research opportunities* are offered in the following general areas of biochemistry:

Biochemical studies in lipid metabolism; structure and function of biological membranes. (Dr. Vagelos)

X-ray analysis of enzyme structure; structure and mechanism of enzymes. (Dr. Banaszak)

Structure-function relationships in protein and enzymes. (Dr. Bradshaw)

Biochemical investigation of metabolic disorders of carbohydrate metabolism. (Dr. B. Brown)

Studies of pathways of carbohydrate metabolism in mammalian tissues. (Dr. D. Brown)

Mechanism of enzyme reactions. (Dr. Drysdale)

Relationship of protein structure and enzyme activity. Kinetic theory and applications to enzyme reactions. (Dr. Frieden)

Biosynthesis of cell wall structures and mechanism of sugar transformations in microorganisms. (Dr. Glaser)

Biochemical studies of protein-lipid interactions; mechanism of blood clotting. (Dr. Jackson)

Nucleic acid biochemistry of eukaryotes in relation to development and differentiation. (Dr. Roeder)

Investigation of fatty acid metabolism and membrane biochemistry through techniques of biochemical genetics. (Dr. Silbert)

Regulation of protein synthesis in prokaryotic and eukaryotic organisms; synthesis and structure of nucleic acids. (Dr. Thach)

Computer methods in biochemistry. (Dr. Holmes)

Biochemistry of collagen. (Dr. Jeffrey)

Research on the structure, function, and biosynthesis of complex oligosaccharides present on mammalian cell surfaces and in serum glycoproteins. (Dr. Kornfeld)

Mechanism of biosynthesis of lipids in mammalian systems. (Dr. Majerus)

Conformation and chemistry of polypeptide hormones. (Dr. Marshall)

Crystal structure and conformation of proteins. (Dr. Mathews)

Studies of proteins specific to the nervous system; their localization, physical and chemical properties. (Dr. B. Moore)

Mass spectrometric studies on molecules of biochemical interest. (Dr. Sherman)

Sex steroid metabolism. (Dr. Warren)

Biochemical transformations of steroid hormones; hormone effects at the cellular level. (Dr. Wiest)

Note—The number preceding the course indicates that the course carries credit in the Graduate School of Arts and Sciences.

Professor and Head of Department

P. Roy Vagelos, A.B., University of Pennsylvania, 1950; M.D., Columbia University, 1954.

Distinguished Service Professor Emeritus

Carl F. Cori, M.D., University of Prague, 1920; Sc.D. (hon.), Yale University, 1946; Sc.D. (hon.), Western Reserve University, 1946; Sc.D. (hon.), Boston University, 1948; Sc.D. (hon.), Cambridge University, 1949; Sc.D. (hon.), Washington University, 1966.

Professors

David H. Brown, B.S., California Institute of Technology, 1942; Ph.D., 1948. (See Administration)

George R. Drysdale, B.S., Birmingham-Southern College, 1948; M.S., University of Wisconsin, 1950; Ph.D., 1952.

Carl Frieden, B.A., Carleton College, 1951; Ph.D., University of Wisconsin, 1955.

Luis Glaser, B.A., University of Toronto, 1953; Ph.D., Washington University, 1956.

Robert E. Thach, A.B., Princeton University, 1961; Ph.D., Harvard University, 1964.

James C. Warren, A.B., University of Wichita, 1950; M.D., University of Kansas, 1954; Ph.D., University of Nebraska, 1961. (See Department of Obstetrics and Gynecology)

Associate Professors

Leonard J. Banaszak, B.S., University of Wisconsin, 1955; M.S., Loyola University, 1960; Ph.D., 1961. (See Department of Physiology and Biophysics)

Ralph A. Bradshaw, B.A., Colby College, 1962; Ph.D., Duke University, 1966.

David F. Silbert, A.B., Harvard University, 1958; M.D., 1962.

Research Associate Professor

Barbara I. Brown, B.A., Smith College, 1946; Ph.D., Yale University, 1950.

Assistant Professors

William F. Holmes, A.B., Princeton University, 1953; Ph.D., University of Pennsylvania, 1960. (See Biomedical Computer Laboratory)

Craig M. Jackson, B.S., Washington State University, 1963; Ph.D., University of Washington, 1967.

John J. Jeffrey, Jr., B.S., College of the Holy Cross, 1958; Ph.D., Georgetown University, 1965. (See Department of Medicine)

Stuart A. Kornfeld, A.B., Dartmouth College, 1958; Ph.D., Washington University, 1962. (See Department of Medicine)

Philip W. Majerus, M.D., Washington University, 1961. (See Department of Medicine)

Garland R. Marshall, B.S., California Institute of Technology, 1962; Ph.D., Rockefeller University, 1966. (See Department of Physiology and Biophysics)

F. Scott Mathews, B.S., University of California, 1955; Ph.D., University of Minnesota, 1959. (See Department of Physiology and Biophysics)

Blake W. Moore, B.S., University of Akron, 1948; Ph.D., Northwestern University, 1952. (See Department of Psychiatry)

Robert G. Roeder, M.S., University of Illinois, 1965; Ph.D., University of Washington, 1969.

William R. Sherman, A.B., Columbia University, 1951; Ph.D., University of Illinois, 1955. (See Department of Psychiatry)

Stuart W. Weidman, A.B., Washington University, 1957; M.A., 1963; Ph.D., University of Chicago, 1965. (See Department of Preventive Medicine and Public Health)

Research Assistant Professor

Alfred W. Alberts, B.S., Brooklyn College, 1953.

Instructor

Walter L. Nulty, Jr., B.A., Southern Illinois University, 1956.

Research Instructor

William H. Holland, A.B., Washington University, 1950. (See Department of Psychiatry)

Research Associate

John M. Fritsch, B.A., Northwestern University, 1962; Ph.D., University of Kansas, 1965. (Also Computer Systems Laboratory)

Research Assistant

Carmelita Lowry, B.S., University of Illinois, 1944.

Lecturer

Walter G. Wiest, A.B., Brigham Young University, 1948; Ph.D., University of Wisconsin, 1952. (See Department of Obstetrics and Gynecology)



The John Milliken Department of Medicine

For the purposes of both teaching and research, the Department of Medicine is divided into specialty divisions under the following directors:

Cardiovascular Diseases

Dr. Oliver

Dermatology

Dr. Eisen

Endocrinology and Metabolism

Drs. Avioli, Daughaday, Kipnis

Gastroenterology

Drs. Alpers, Kinzie

Health Care Research

Dr. Perkoff

Hematology

Dr. Majerus

Hypertension

Dr. H. M. Perry

Immunology and Connective Tissue Diseases

Drs. Liebhaver, C. Parker

Infectious Diseases

Dr. Medoff

Laboratory Medicine

Dr. Jarrett

Medical Genetics

Dr. Sly

Nutrition

Dr. Shank

Oncology

Drs. Kornfeld, Little, Reinhard

Peripheral Vascular Diseases

Dr. Wessler

Pulmonary Diseases

Drs. Pierce, Senior

Renal Diseases

Drs. Klahr, Lubowitz



Instruction in Medicine is provided during all four years of the medical curriculum beginning with human genetics and an introductory course in the first year. Teaching in the second year has two main objectives: the correlation of the basic sciences with the clinical aspects of disease, and training in the technical methods of physical examination and laboratory diagnosis. By the beginning of the third year, the student is prepared for supervised clinical study of individual patients. A junior clerkship of twelve weeks, divided into two six-week periods, is served on one of the medical services supervised by the Department. In the final year, students may elect a sub-internship in general medicine or select any of a series of elective courses offered in the various medical subspecialties.

FIRST YEAR

Human Genetics. This course, taught by the Division of Medical Genetics of the Department of Pediatrics and by the Department of Medicine, is divided into three parts: cytogenetics, biochemical genetics, and population genetics. Each section consists of ten to twelve formal lectures in one of these three areas, followed by a clinical correlation session presenting a series of patients who illustrate the genetic principles covered in the lectures. A serious attempt is made to correlate the studies in biochemistry, microbiology, and biostatistics with problems relevant to clinical medicine.

(Dr. Sly and Staff)

Topics in Clinical Medicine. This interdepartmental course is designed to stimulate student interest in clinical medicine through carefully selected and presented discussions of both the clinical and basic science features of a number of illnesses. The course director involves faculty from the several clinical departments in structuring the direction, content, and presentation of the subject.

(Dr. Kipnis and Staff)

SECOND YEAR

Teaching by the Department of Medicine is designed to (a) prepare the student for the transition from the preclinical sciences to the study of the sick patient at the bedside, (b) help him analyze the manifestations of disease in terms of the altered mechanisms responsible for these manifestations, and (c) introduce him to the techniques of examination which are used regularly on all clinical services with the beginning of junior clerkships. This instruction is at times undertaken jointly with members of other clinical departments, and is coordi-

nated when practicable with subject matter presented by the Department of Pathology.

(a) *Pathophysiology.* Selected topics in clinical medicine are discussed in detail to illustrate the application of biochemical, physiological, and anatomical information in the understanding of pathological states. Infectious, cardiovascular and renal, neurological, gastrointestinal, hematological, metabolic, nutritional, and developmental diseases are reviewed by an interdepartmental faculty. Emphasis is placed on the use of fundamental information in approaching clinical problems as a way of thinking in preparation for a lifetime of medicine, during which much new information will constantly be acquired.

(Drs. Avioli, Coxe, Feigin,
Vietti, C. Weldon)

(b) *Clinical Diagnosis.* Lectures, demonstrations, and supervised bedside experience in the techniques of history taking and physical examination.

(Drs. Garfinkel, Wessler, and Staff)

(c) *Laboratory Methods of Diagnosis.* Lectures and laboratory course in microscopic, bacteriological, serological, and chemical methods of diagnosis.

(Dr. Brown and Staff)

THIRD YEAR

General Medicine. Supervised study of patients on the medical nursing divisions of Barnes Hospital (both Blue and Red), Jewish Hospital, Starkloff City Hospital, and St. Louis Veterans Administration Hospital. Students are assigned in rotation as clinical clerks to the patients admitted to these services. Teaching is provided by attending physicians, house officers, consultants, and

at regularly scheduled conferences. Formal instruction will be given in medical therapeutics during the junior clerkship. Students serve for six weeks on two of the five services.

(Drs. Aach, Daughaday, Kipnis, Perkoff, H. M. Perry, Reinhard, Vavra, Wessler, and Staff)

(a) *Friday Noon Medical Clinics.* Cases which have been studied by students working in the wards of Barnes Hospital are presented before the third- and fourth-year classes to illustrate medical problems of particular interest.

(Dr. Kipnis and Staff)

(b) *Clinical Pathological Conference.* Abstracts of the clinical records of patients upon whom postmortem examinations have been performed are presented in advance to members of the third- and fourth-year classes and to members of the medical staff. At each conference the diagnosis is discussed in detail by the clinical staff before the anatomical findings are presented by the pathologists.

(Dr. Kipnis and Medical Staff,
Dr. Kissane and Pathology Staff)

FOURTH YEAR

Electives

Medical Sub-internship. Medical sub-internships, in multiples of six weeks, are offered to a limited number of students on the following medical services: Barnes Hospital Blue Service, Jewish Hospital, Starkloff City Hospital, St. Louis Veterans Administration Hospital, and St. Luke's Hospital. Duties and responsibilities, including nights on call, will be those of an intern with the proviso that requirements of Missouri state law must be met (e.g., orders must be countersigned by a licensed physician, etc.). The work load will be lighter than that for interns to insure

ample time for reading about patients. Instruction and supervision will be provided by the appropriate chief of service, attending physicians, consultants, and house officers. Attendance at scheduled teaching conferences is required. The sub-internship should be especially valuable to students who plan to take straight medical internships and to those who plan to go directly into a specialty residency program without first serving an internship of any kind (e.g., neurology, psychiatry, etc.).

(Drs. Aach, Daughaday, Kipnis, Paine, Perkoff, H. M. Perry, Reinhard, Vavra, Wessler, and Staff)

General Medicine and Subspecialty Clinics. Six weeks, all day. Designed to give the students an opportunity to work up and follow in the general medicine clinic patients for whom they have primary responsibility under supervision of the part-time and full-time staff. Subspecialty clinic participation is included in the clerkship and is integrated with specialty rounds held in conjunction with the clinic. Subspecialty clinics include dermatology, arthritis, renal, GI, metabolism and hematology. May be elected once for six weeks or twice for twelve weeks, which would provide better opportunity for follow-up of patients.

(Dr. Crespin and Staff)

Friday Noon Medical Clinics. Medical problems of particular interest.

(Dr. Kipnis and Staff)

Clinical Pathological Conference. Thursdays, 12-1 p.m., September to June.

(Dr. Kipnis and Medical Staff,
Dr. Kissane and Pathology Staff)

Arthritic and Rheumatic Diseases. (See Department of Preventive Medicine and Public Health.)

Cardiovascular Disease

(a) Electrocardiography, elementary vectorcardiography. Lectures and practical demonstrations designed to provide a solid base of electrocardiographic knowledge.

(Drs. Bahl, Hellam, B. Parker, Wolff)

(b) Clinical Cardiology, St. Luke's Hospital, six weeks, all day. Students are assigned to intensive care service, the heart station, and the Radiology Department. (Dr. Paine)

(c) Clinical Cardiopulmonary Physiology, Jewish Hospital, six weeks, all day. Experience in heart station, coronary care unit, pulmonary station, and catheter laboratory. (Dr. Oliver)

(d) Research (minimum of twelve weeks, all day).

1. Myocardial contraction, experimental pharmacology, cellular physiology. (Dr. Smith)

2. Muscle contraction and electrophysiology. (Dr. Hellam)

3. Pulmonary vasomotion and the physiology of pulmonary embolism. (Dr. B. Parker)

4. Biochemistry and measurement of cardiac glycosides; computer application to cardiology. (Dr. Oliver)

5. Experimental thrombosis. (Dr. Wessler)

6. Pathogenic mechanisms of hypertension. (Dr. H. M. Perry)

Dermatology

(a) Clinical Clerkship. Students participate in both inpatient and outpatient care. Stress is placed on the dermatologic variations normally encountered, identification of common skin diseases, dermatologic clues to systemic

disease, etc. Instruction is given in cutaneous histopathology and clinical mycology.

(Dr. Eisen and Staff)

(b) Research (minimum of twelve weeks, all day).

1. Connective tissue, macromolecular organization, degradation, and related problems. (Dr. Eisen)

2. Studies of *Histoplasma capsulatum* and other mycotic agents. (Dr. Kobayashi)

Gastroenterology

(a) Clinical gastroenterology. Six weeks, all day. Students participate in the study of patients on whom consultations have been requested, receive instruction in specialized diagnostic techniques, and participate in the conferences and clinics run by the Division.

(Drs. Aach, Alpers)

(b) Research (minimum of twelve weeks, all day). (Drs. Aach, Alpers)

Genetics

(a) Medical Genetics. Twelve weeks, all day. Combined clinical and research course. (Drs. Kaufman, Sly)

(b) Experience in clinical or laboratory investigative approach to the study of genetic problems. (Drs. Kaufman, Sly)

Hematology

(a) Clinical hematology: Six weeks, all day. Students receive intensive instruction in morphology, specialized diagnostic techniques, management of patients with hematologic disorders. Two separate clerkships are offered. (Drs. Brown, Kornfeld, Majerus, Reinhard)

(b) Clinical blood coagulation. Six weeks, all day. Students learn to perform the tests

of blood coagulation and then participate in the evaluation of patients with bleeding disorders. (Dr. Sherman)

(c) Hemostasis, thrombosis, blood coagulation, and fibrinolysis. Series of twelve weekly seminars. (Dr. Fletcher)

(d) Research (minimum twelve weeks, all day).

1. Normal and deranged iron metabolism. (Dr. Brown)
2. Clinical and biochemical studies of patients with suspected defects in erythrocyte energy metabolism. (Dr. Vavra)
3. Lipid metabolism in platelets. (Dr. Majerus)
4. Biochemical studies of the process of transformation in malignancy. (Dr. Majerus)
5. Biochemical studies of erythrocytes and glycoproteins of hematologic interest. (Dr. Kornfeld)
6. Sugar nucleotide metabolism and its control in white blood cells and platelets. (Dr. Kornfeld)

Immunology

(a) Clinical immunology. Series of 24 lectures and seminars on immunologic mechanisms in disease. (Dr. C. Parker)

(b) Research. Minimum 12 weeks, all day.

1. Research in clinical or basic immunology (cellular immunity, immunologic deficiency diseases, antigen processing by macrophages). (Dr. C. Parker)
2. Antibody structure, antibody biosynthesis, and antibody binding reactions. (Dr. Little)

3. Plasma protein metabolism, particularly as related to the immune system. (Dr. Wochner)

Infectious Disease

(a) Clinical infectious disease and bacteriology. Jewish Hospital, six weeks, all day. (Drs. Little, Sonnenwirth)

(b) Clinical infectious diseases. Barnes Hospital, six weeks, all day. (Drs. Gelb, Medoff)

Laboratory Medicine

(a) Topics in laboratory medicine. A series of twelve seminars over a six-week period covering topics intended to demonstrate the role of laboratory medicine in the diagnosis and therapeutic management of disease. (Dr. Jarrett and Staff)

(b) Research. Minimum twelve weeks, all day. Hormone-membrane interaction; hormone regulation of adipocyte metabolism; lung cancer tumor specific antigens; platelet-plasma phospholipid interactions; clinical use of ion-specific electrodes; computer applications in the clinical laboratory.

(Drs. Bell, Davis, Jarrett, Joist, Ladenson, Lewis, Sherman)

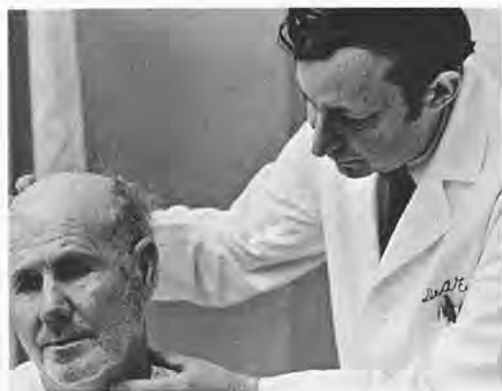
Metabolism and Endocrinology

(a) Seminar: Endocrine physiology and the biochemical aspects of hormone action. Twelve weeks. Offered once a year.

(Drs. Avioli, Chase, Daughaday, Kipnis)

(b) Clinical clerkship, endocrine patients at Barnes, Jewish, and Children's Hospitals. Six weeks, all day. (Dr. Daughaday and Staff)

(c) Research. Minimum of twelve weeks, all day.



1. Pituitary physiology; growth hormone, prolactin. (Dr. Daughaday)
2. Experimental diabetes, insulin action, intermediary metabolism of fats and carbohydrates. (Dr. Kipnis)
3. Calcium and parathyroid metabolism, vitamin D. (Dr. Avioli)

Pulmonary Disease and Function. Six weeks, all day. (Drs. Pierce, Senior)

Renal Disease

(a) Clinical nephrology. Six weeks, all day. Study of patients with renal disease and electrolyte disorders.

(Drs. Klahr, Lubowitz, Slatopolsky)

(b) Mixed clinical and research elective in renal disorders and transport. Eighteen weeks, all day. Research activities can be selected in general renal pathophysiology, micropuncture technics, or transport. Limit three students. (Dr. Klahr and Staff)

(c) Renal and electrolyte disorders. Jewish Hospital, six weeks, all day. (Dr. Lubowitz)

(d) Micropuncture studies of transport systems in the renal medulla. Twelve weeks, all day. (Dr. Lubowitz)

Ethical Problems in Medicine. Twelve weekly seminars. (Dr. Vavra)

Busch Professor and Head of the Department

David M. Kipnis, A.B., Johns Hopkins University, 1945; M.A., 1949; M.D., University of Maryland, 1951.

Sydney M. and Stella H. Shoenberg Professor

Louis V. Avioli, B.A., Princeton University, 1953; M.D., Yale University, 1957.

John E. and Adaline Simon Professor

Stanford Wessler, B.A., Harvard University, 1938; M.D., New York University, 1942. (Chief, Washington University Medical Service, Jewish Hospital)

Professors

David Hershel Alpers, B.A., Harvard College, 1956; M.D., 1960.

Elmer B. Brown, Jr., A.B., Oberlin College, 1946; M.D., Washington University, 1950. (See Administration)

Hugh Chaplin, Jr., A.B., Princeton University, 1943; M.D., Columbia University, 1947. (See Department of Preventive Medicine and Public Health)

William H. Danforth, A.B., Princeton University, 1947; M.D., Harvard University, 1951. (See Administration)

William H. Daughaday, A.B., Harvard University, 1940; M.D., 1943.

Arthur Z. Eisen (Dermatology), B.A., University of Buffalo, 1951; Sc.M., Brown University, 1953; M.D., University of Pennsylvania, 1957.

Carl G. Harford, A.B., Amherst College, 1928; M.D., Washington University, 1933.

M. Kenton King, B.A., University of Oklahoma, 1947; M.D., Vanderbilt University, 1951. (See Administration and Department of Preventive Medicine and Public Health)

John Esben Kirk, M.D., University of Copenhagen, 1929. (See Division of Gerontology)

Saulo Klahr (Established Investigator of the American Heart Association), M.D., Universidad Nacional de Colombia, 1959.

Stuart A. Kornfeld, A.B., Dartmouth College, 1958; M.D., Washington University, 1962. (See Department of Biological Chemistry)

J. Russell Little, Jr., A.B., Cornell University, 1952; M.D., University of Rochester, 1956. (See Department of Microbiology)

Philip W. Majerus, M.D., Washington University, 1961. (See Department of Biological Chemistry)

Charles Ward Parker, M.D., Washington University, 1953. (See Department of Microbiology)

Gerald T. Perkoff, M.D., Washington University, 1948. (See Department of Preventive Medicine and Public Health and Division of Health Care Research)

H. Mitchell Perry, M.D., Washington University, 1946. (Chief, Washington University Medical Service, St. Louis V.A. Hospitals)

John A. Pierce, M.D., University of Arkansas, 1948.

Edward H. Reinhard, A.B., Washington University, 1935; M.D., 1939. (See Department of Radiology)

Robert Ely Shank, A.B., Westminster College, 1935; M.D., Washington University, 1939. (See Department of Preventive Medicine and Public Health)

John R. Smith, A.B., University of Wisconsin, 1931; A.M., 1932; M.D., Washington University, 1934. (See Department of Physiology and Biophysics)

Professors Emeriti (Clinical)

Alfred Goldman, A.B., Washington University, 1916; M.D., 1920; M.S., 1922.

Clinton Welsh Lane (Dermatology), A.B., St. Mary's College (Kansas), 1916; M.D., St. Louis University, 1921.

Professors (Clinical)

Bernard T. Garfinkel, M.D., Washington University, 1948. (See Division of Health Care Research)

Michael M. Karl, B.S., University of Wisconsin, 1936; M.D., University of Louisville, 1938.

Edward Massie, A.B., Washington University, 1931; M.D., 1935.

Robert Paine, M.D., Harvard University, 1944. (St. Luke's Hospital)

Associate Professors

Richard D. Aach, A.B., Washington University 1955; M.D., 1959.

Anthony P. Fletcher, B.M., University of London, 1943; B.S., 1943; M.D., 1949.

Samuel B. Guze, M.D., Washington University, 1945. (See Administration and Department of Psychiatry)

Leonard Jarett, B.A., Rice University, 1958; M.D., Washington University, 1962. (See Department of Pathology) (Director of Diagnostic Laboratories, Barnes Hospital)

George S. Kobayashi (Mycology-Dermatology), B.S., University of California, 1952; Ph.D., Tulane University, 1963. (See Department of Microbiology)

Harvey Liebhaver, A.B., New York University, 1953; M.D., 1957. (See Department of Microbiology) (Jewish Hospital)

Herbert Lubowitz, A.B., Clark University, 1954; M.D., Washington University, 1958.

Gerald Medoff, A.B., Columbia College, 1958; M.D., Washington University, 1962. (See Department of Microbiology)

G. Charles Oliver, A.B., Harvard University, 1953; M.D., 1957.

Gustav Schonfeld, A.B., Washington University, 1956; M.D., 1960. (See Department of Preventive Medicine and Public Health)

Robert M. Senior, A.B., Oberlin College, 1957; M.D., George Washington University, 1961.



Laurence A. Sherman, B.A., B.S., University of Chicago, 1956; M.D., Albany Medical College, 1964. (See Department of Pathology)

Eduardo Slatopolsky, M.D., University of Buenos Aires, 1959.

William S. Sly, M.D., St. Louis University, 1957. (Faculty Associate, American Cancer Society) (See Department of Pediatrics)

John D. Vavra, B.A., University of Colorado, 1950; M.D., Washington University, 1954. (See Administration, Department of Preventive Medicine and Public Health, and Division of Health Care Research) (Chief, Washington University Medical Service, Starkloff Hospital)

R. Dean Wochner, A.B., Arizona State College, 1956; M.D., Washington University, 1960. (Hospital Commissioner of St. Louis and Director of Health and Hospitals) (See Department of Preventive Medicine and Public Health)

Research Associate Professors

Norma A. Fletcher, M.S., The Technical University (Denmark), 1949; Ph.D., University of Copenhagen, 1965.

Rosalind H. Kornfeld (Leukemia Society of America Scholar), B.S., George Washington University, 1957; Ph.D., Washington University, 1961.

Virginia Minnich, B.S., Ohio State University, 1937; M.S., Iowa State College, 1938.

Ee Thye Yin, B.Sc., University of London, 1954.

Associate Professor Emeritus (Clinical)

William H. Olmsted, B.S., Coe College, 1909; M.D., Johns Hopkins University, 1913.

Associate Professors (Clinical)

I. J. Flance, A.B., Washington University, 1931; M.D., 1935.

Ralph V. Gieselman, M.D., Washington University, 1947.

Paul O. Hagemann, A.B., Washington University, 1930; M.D., 1934.

Robert S. Karsh, A.B., Washington University, 1951; M.D., 1952.

Virgil Loeb, Jr., M.D., Washington University, 1944. (See Department of Pathology)

William D. Perry, A.B., Northwest Missouri State College, 1943; B.S. in Medicine, University of Missouri, 1945; M.D., Washington University, 1947.

Burton A. Shatz, A.B., Washington University, 1940; M.D., 1943.

Assistant Professors

Robert H. Allen, A.B., Amherst College, 1960; M.D., Washington University, 1966.

Om P. Bahl, M.B.B.S., Punjab University (India), 1957; M.R.C.P., University of Edinburgh, 1960.

Robert W. Barton, B.S., University of Chicago, 1962; M.D., 1967; Ph.D., 1967.

C. Elliott Bell, Jr. (Laboratory Medicine), B.S., Tulane University, 1960; M.D., 1964. (See Department of Pathology)

Clifford A. Birge, A.B., Amherst College, 1956; M.D., Washington University, 1961. (See Division of Health Care Research)

Stanley Julius Birge, Jr. (Established Investigator of the American Heart Association), B.A., Amherst College, 1959; M.D., Washington University, 1963.

Richard B. Byrd, M.D., St. Louis University, 1954; M.S.Med., University of Minnesota, 1960.

Lewis Robert Chase (Howard Hughes Medical Institute Investigator), A.B., Princeton University, 1960; M.D., Harvard University, 1964.

Jon D. Cooksey, M.D., Tulane University, 1962. (See Department of Preventive Medicine and Public Health)

Philip E. Cryer (American College of Physicians Teaching and Research Scholar), B.A., Northwestern University, 1961; M.D., 1965.

James E. Davis, B.A., Occidental College, 1965; M.S., Duke University, 1969; Ph.D., 1970. (See Department of Pathology)

Malcolm T. Foster, Jr., B.S., Wake Forest College, 1959; M.D., 1963.

Lawrence D. Gelb, B.S., University of Michigan, 1960; M.D., Harvard Medical School, 1963. (See Department of Microbiology)

John G. Haddad, Jr., B.A., Tulane University, 1958; M.D., 1962.

Bevra H. Hahn, B.Sc., Ohio State University, 1960; M.D., Johns Hopkins University, 1964. (See Department of Preventive Medicine and Public Health)

Theodore J. Hahn, Jr., A.B., Princeton University, 1960; M.D., Johns Hopkins University, 1964.

Duane C. Hellam, B.A., Arizona State College, 1955; M.D., Washington University, 1959. (See Department of Physiology and Biophysics)

Phillip E. Hoffsten, B.S., Washington University, 1961; M.D., 1965.

John O. Holloszy, M.D., Washington University, 1957. (See Department of Preventive Medicine and Public Health and Irene Walter Johnson Institute of Rehabilitation)

Laurence S. Jacobs, A.B., Harvard University, 1960; M.D., University of Rochester, 1965.

Johann H. Joist, M.D., University of Cologne, 1962. (See Department of Pathology)

Owen S. Kantor, M.D., University of Missouri, 1968. (See Department of Preventive Medicine and Public Health and Division of Health Care Research)

Robert L. Kaufman, A.B., Washington University, 1959; M.D., 1963. (See Department of Pediatrics)

Joseph Lee Kinzie, Jr., B.A., Bridgewater College, 1959; M.D., University of Virginia, 1963.

Robert E. Kleiger, B.A., Yale University, 1956; M.D., Harvard Medical School, 1960.

Ronald Krone, M.D., University of Chicago, 1966.

Jack H. Ladenson, B.S., Pennsylvania State University, 1964; Ph.D., University of Maryland, 1971. (See Department of Pathology)

Stephen S. Lefrak, A.B., Colgate University, 1960; M.D., State University of New York, Downstate, 1965.

J. Joseph Marr, B.S., Xavier University, 1959; M.D., Johns Hopkins University, 1964; M.S., St. Louis University, 1968. (See Department of Microbiology)

Debesh Mazumdar, M.B., All India Institute of Medical Sciences, New Delhi, 1964; B.S., 1964.

Gerald G. Morris, A.B., George Washington University, 1962; M.D., 1965. (See Department of Preventive Medicine and Public Health)

Anthony S. Pagliara, B.S., Union College, 1960; M.D., Albany Medical College, 1965. (See Department of Pediatrics)

Mary L. Parker, B.S., Florida State University, 1946; M.S., 1949; M.D., Washington University, 1953. (See Departments of Pediatrics and of Preventive Medicine and Public Health) (University Health Service)

Marshall A. Permutt (Howard Hughes Medical Institute Investigator in Medicine), B.A., Johns Hopkins University, 1961; M.D., Washington University, 1965.

Cary A. Presant, M.D., State University of New York at Buffalo, 1966.

Alan M. Robson, M.B.B.S., University of Durham (England), 1959; M.D., 1964. (See Department of Pediatrics)

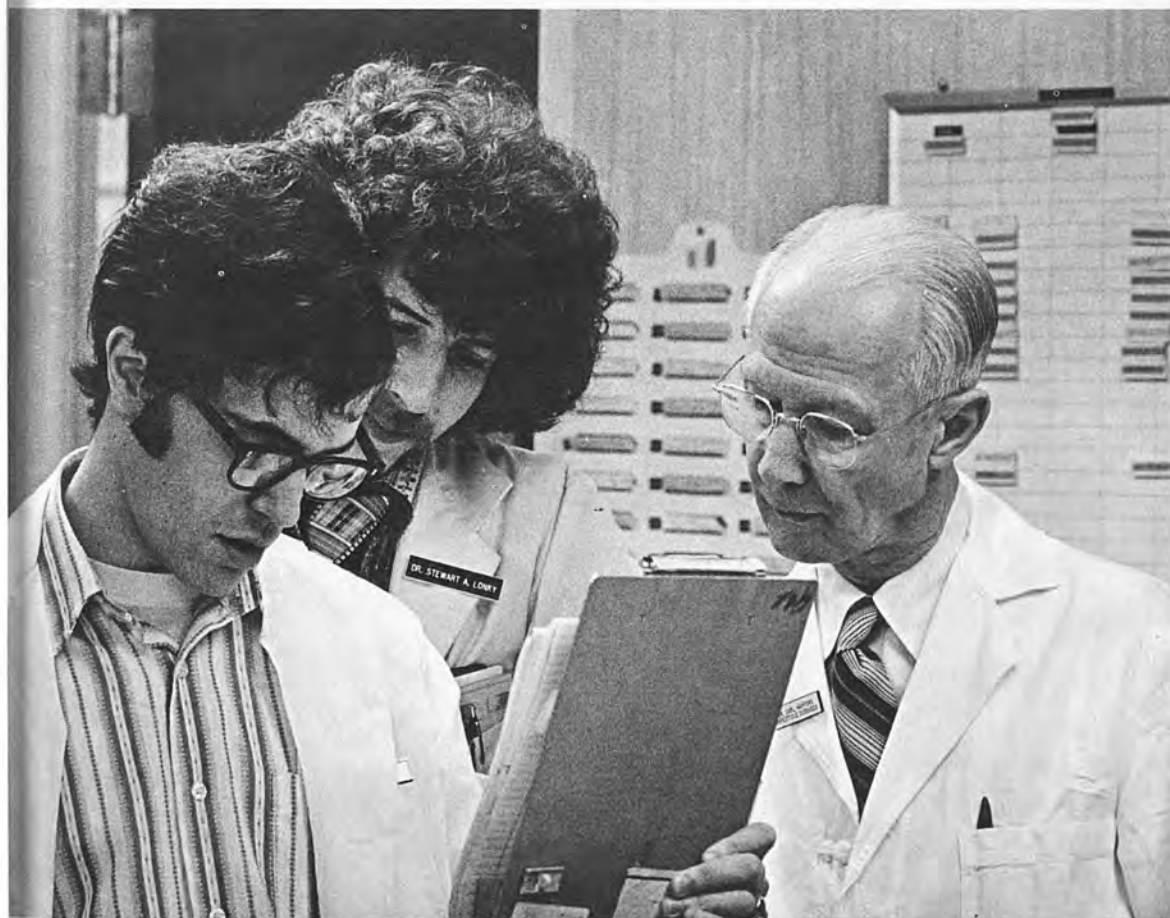
Daniel Rosenblum, B.S., University of Chicago, 1962; M.D., 1966. (Jewish Hospital)

Isaias Spilberg, B.S., University of San Marcos (Peru), 1956; M.D., 1963. (See Department of Preventive Medicine and Public Health)

Gurdarshan S. Thind, M.B., Punjab University (India), 1957; B.S., 1957; M.D., 1962; M.Sc., University of Pennsylvania, 1966.

Research Assistant Professor Emeritus

Anna R. Dubach, A.B., Bryn Mawr College, 1919; M.S., University of Colorado, 1935; Ph.D., 1938.



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Research Assistant Professors

Michiyasu Awai, B.S., Osaka College of Technology, 1948; M.D., Okayama University, 1953; Ph.D., 1959.

Michael Beamish, M.B.C.H., Birmingham University, 1963.

John J. Jeffrey, Jr. (Dermatology), B.S., College of the Holy Cross, 1958; Ph.D., Georgetown University, 1965. (See Department of Biological Chemistry)

Irene E. Karl, B.S., University of Wisconsin, 1937; M.A., 1938; Ph.D., 1940.

Mabel L. Purkerson, A.B., Erskine College, 1951; M.D., Medical College of South Carolina, 1956. (See Department of Pediatrics)

Doris Rolf, A.B., Harris Teachers College, 1936.

Shiu Y. Yu, B.S., Provincial College (Formosa), 1951; M.S., Oklahoma State University, 1956; Ph.D., St. Louis University, 1963.

Assistant Professors Emeriti (Clinical)

Charles H. Eyermann, M.D., St. Louis University, 1911.

Samuel B. Grant, B.S., Washington University, 1918; M.D., 1920.

Arthur E. Strauss, B.S., Harvard University, 1912; M.D., 1917.

Assistant Professors (Clinical)

Morris Alex, B.S., University of Missouri, 1942; M.D., Washington University, 1943. (See Division of Health Care Research)

France Alexander, A.B., Indiana University, 1950; M.D., 1953. (Director, Medical Service, Homer G. Phillips Hospital)

Grace E. Bergner, A.B., Washington University, 1939; M.D., 1943.

John W. Berry, B.S., University of Toledo, 1943; M.D., St. Louis University, 1946.

Morton A. Binder, B.S., Yale University, 1948; M.D., Columbia University, 1951.

Benjamin A. Borowsky, M.D., Washington University, 1958.

Francis Joseph Catanzaro, M.D., Washington University, 1948.

Adolph H. Conrad, Jr. (Dermatology), A.B., Washington University, 1934; M.D., 1938.

Stephen R. Crespín, A.B., Harvard Medical School, 1960; M.D., 1965.

Joseph C. Edwards, A.B., University of Oklahoma, 1930; M.D., Harvard University, 1934.

Donald H. Finger, A.B., Washington University, 1949; M.D., 1950.

Bernard Friedman, A.B., University of Wisconsin, 1931; M.D., 1934.

Melvin L. Goldman, A.B., Washington University, 1939; M.D., 1943.

Neville Grant, A.B., Yale University, 1950; M.D., Columbia University, 1954.

William Kearney Hall (Dermatology), B.S., Yale University, 1939; M.D., Harvard University, 1942.

David T. Hammond, A.B., Indiana University, 1957; M.D., Washington University, 1960.

Stanley Forrest Hampton, A.B., Washington and Lee University, 1930; M.D., Washington University, 1934.

James H. Hutchinson, Jr., B.S., Arkansas A. and M. College, 1942; M.D., University of Arkansas, 1945.

Sidney Jick, M.D., Washington University, 1949.

Harold J. Joseph, B.A., University of Texas, 1947; M.D., 1950.

Robert W. Kelley, A.B., Southwestern College, 1932; M.D., Washington University, 1936.

Charles Kilo, M.D., Washington University, 1953; M.D., 1959.

Robert C. Kingsland, A.B., Washington University, 1933; M.D., 1937.

Norman P. Knowlton, Jr., B.S., Harvard University, 1942; M.D., 1945.

Marvin E. Levin, A.B., Washington University, 1947; M.D., 1951.

- Douglas R. Lilly, A.B.**, Princeton University, 1952; M.D., Washington University, 1956.
- Morris D. Marcus (Dermatology)**, M.D., Washington University, 1934.
- Robert S. Mendelsohn, B.A.**, Washington and Lee University, 1950; M.D., Washington University, 1954. (See Division of Health Care Research)
- Morris Moore (Mycology-Dermatology)**, S.B., Boston University, 1928; A.M., Harvard University, 1929; Ph.D., Washington University, 1933.
- J. Roger Nelson, A.B.**, Washington University, 1949; M.D., 1953.
- James F. Nickel, A.B.**, University of Oklahoma, 1944; M.D., Washington University, 1948.
- Charles C. Norland, B.S.**, Washington State University, 1955; M.D., Washington University, 1959.
- Robert C. Packman, A.B.**, Washington University, 1953; B.S.Med., University of Missouri, 1954; M.D., Washington University, 1956.
- James C. Peden, Jr., A.B.**, Haverford College, 1951; M.D., Washington University, 1955.
- William J. Phillips, B.A.**, Oklahoma State University, 1959; M.D., Washington University, 1963.
- Kenneth C. Price, M.D.**, University of Washington, 1951.
- Harold K. Roberts, B.A.**, Ohio State University, 1935; M.D., 1939.
- Ernest T. Rouse, B.S.**, Alabama Polytechnic Institute, 1939; M.D., Washington University, 1943.
- Shabbir Haider Safdar, F.Sc.**, Government College Jhang, 1954; M.D., Nishtar Medical College (Multan, Pakistan), 1961. (St. Louis V.A. Hospitals)
- Llewellyn Sale, Jr., A.B.**, Yale University, 1936; M.D., Washington University, 1940.
- Harold Scheff, M.D.**, University of Toronto, 1931.
- James C. Sisk (Dermatology)**, A.B., Washington University, 1943; M.D., 1946.
- Franz U. Steinberg, M.D.**, University of Berne, 1938. (See Departments of Preventive Medicine and Public Health and of Surgery) (Jewish Hospital)
- Barrett L. Taussig, A.B.**, Harvard University, 1928; M.D., Washington University, 1932.
- Stanley M. Wald, M.D.**, Washington University, 1946.
- Alvin S. Wencker, A.B.**, Washington University, 1949; M.D., 1953.
- Ray David Williams, A.B.**, Hampden-Sydney College, 1930; M.S., Emory University, 1931; M.D., Washington University, 1937.
- Keith S. Wilson, A.B.**, Williams College, 1930; M.D., Washington University, 1934.
- Gerald A. Wolff, A.B.**, Harvard College, 1955; M.D., Washington University, 1961.
- Herbert B. Zimmerman, M.D.**, Washington University, 1951.

Instructors

- Khawaja S. Ahmed, M.B.**, Lucknow University (India), 1953; B.S., 1953; M.D., 1958.
- Ranjit M. Bagwe, B.M.**, B.S., University of Baroda, 1960; M.D., 1965.
- Eugene A. Bauer, B.S.**, Northwestern University, 1963; M.D., 1967. (Trainee NIAMD, Dermatology) (On leave of absence)
- Edgar C. Boedeker, A.B.**, Harvard University, 1964; M.D., Washington University, 1968. (Assistant Director, Washington University, Medical Service)
- J. Michael Bone, B.Sc.**, University of Edinburgh, 1961; M.B.Ch.B., 1964.
- Greta Camel, A.B.**, University of Wisconsin, 1946; M.D., 1949.
- James H. Dauber, B.S.**, Cornell University, 1964; M.D., 1969. (Assistant Director, Washington University Medical Service)
- Herschel R. Harter, B.S.**, Marquette University, 1962; M.D., Georgetown University, 1966.

Howard E. Linder (Fellow in Pulmonary Diseases), A.B., Asbury College, 1961; M.D., University of Cincinnati, 1965.

Robin B. Lockhart-Ewart, B.Sc., University of Edinburgh, 1961; M.B.Ch.B., 1964; D.Phil., University of Sussex (England), 1971.

Lewis P. Parker (Fellow in Arthritis and Connective Tissue Diseases), B.A., Middlebury College, 1962; M.D.C.M., McGill University, 1966.

Reginald P. Pugh, B.A., University of Michigan, 1953; M.D., 1955. (Chief of Medical Service, Ellis Fischel State Cancer Hospital)

Anton C. Schoolwerth, A.B., Princeton University, 1963; M.D., Harvard Medical School, 1967.

Timothy J. Sullivan III, A.B., Williams College, 1962; M.D., University of Miami, 1966.

Peter G. Tuteur, A.B., Johns Hopkins University, 1962; M.D., University of Illinois, 1966.

James R. Wiant, A.B., Princeton University, 1955; M.D., Jefferson Medical College, 1959. (St. Louis V.A. Hospitals)

Research Instructors

Janina M. Brajtborg, M.S., University of Lodz (Poland), 1950; Ph.D., 1968.

Teofil Kheim, M.D., University of Budapest, 1934. (See Division of Gerontology)

Ida K. Mariz, A.B., Washington University, 1940.

Floyd M. Nolle (Cardiology), B.S., Washington University, 1961; M.S., 1968; D.Sc., 1972. (See Biomedical Computer Laboratory)

Jo L. Seltzer (Dermatology), A.B., Washington University, 1963; Ph.D., 1969.

Sister Ann Marie Skinner, R.S.M., A.B., Harris Teachers College, 1931; M.A., St. Louis University, 1936.

Instructors Emeriti (Clinical)

Louis F. Aitken, B.S., University of Illinois, 1923; M.D., Washington University, 1927.

Aaron Birenbaum, M.D., Washington University, 1948.

Lee B. Harrison, A.B., University of Utah, 1925; M.D., Washington University, 1927.

J. Ted Jean, A.B., Indiana University, 1924; M.D., Washington University, 1928.

David Miller Skilling, Jr., B.S., Washington and Jefferson College, 1923; M.D., Washington University, 1928. *

Instructors (Clinical)

Charles C. Abel, A.B., Westminster College, 1952; M.D., Washington University, 1956.

Oliver Abel III, Westminster College, 1951; M.D., Washington University, 1955.

Harry Agress, B.S., Washington University, 1932; M.D., 1932.

Jorge M. Alegre, M.D., San Marcos University (Peru), 1965.

James W. Bagby (Dermatology), A.B., University of Missouri, 1930; B.S.Med., 1931; M.D., Washington University, 1933.

Jack Barrow, M.D., Washington University, 1946.

Walter M. Baumgarten, Jr., A.B., Washington University, 1935; M.D., 1939.

Benje Boonshaft, A.B., Washington University, 1957; M.D., 1961.

Dee C. Boswell, B.S., University of Illinois, 1959; M.D., 1963.

Edward W. Cannady, A.B., Washington University, 1927; M.D., 1931.

John M. Cary, A.B., Central College, 1954; M.D., St. Louis University, 1958.

Benjamin H. Charles, M.B., Ch.B., University of Edinburgh, 1934.

Margaret Chieffi, M.D., University of New Zealand, 1937.

Philip Comens, B.S.Med., University of Missouri, 1949; M.D., Washington University, 1951.

Ralph Copp, Jr., A.B., Washington University, 1948; M.D., 1952.



Duane E. Cozart, Ph.B., University of Chicago, 1947; A.B., Washington University, 1949; M.D., Medical College of Virginia, 1959.

Arnold Dankner, M.D., Washington University, 1947.

John D. Davidson, A.B., Washington University, 1948; M.D., 1952.

Norman W. Drey, A.B., Princeton University, 1932; M.D., Washington University, 1936.

Julius Elson, M.D., Washington University, 1928.

Alfred Fleishman, B.S., Washington University, 1935; M.D., 1935.

Bruce Todd Forsyth, M.D., Washington University, 1947.

Arthur H. Gale, B.S., Washington University, 1955; M.D., University of Missouri, 1959.

Kenneth W. Gentsch, A.B., Princeton University, 1954; M.D., Washington University, 1958.

Arnold M. Goldman, A.B., Harvard University, 1955; M.D., Washington University, 1959. (See Division of Health Care Research)

Benjamin M. Goldstein, B.A., Washington University, 1960; M.D., 1964.

Ronald K. Grady, B.S., Purdue University, 1956; M.S., 1957; M.D., Washington University, 1966.

John M. Grant, A.B., Princeton University, 1950; M.D., Washington University, 1954.

Axel R. Gronau, M.D., University of Naples, 1935.

Mark J. Halloran, M.D., Marquette University, 1959.

Lee W. Hawkins, A.B., Haverford College, 1948; M.D., Washington University, 1952.

James Neil Heins, A.B., University of Louisville, 1957; M.D., 1961.

John L. Horner, A.B., Washington University, 1932; M.D., 1936.

Richard F. Huck, B.S., Notre Dame University, 1947; M.D., Washington University, 1948.

Bernard Hulbert, B.A., University of Wisconsin, 1938; M.D., 1941.

William G. Juergens, Jr., M.D., Washington University, 1961.

John J. Kelly, B.S., Rockhurst College, 1959; M.D., St. Louis University, 1963.

David N. Kerr, A.B., University of Colorado, 1936; M.D., Washington University, 1941.

Melvin B. Kirstein, B.S., Indiana University, 1930; M.D., 1933.

Robert E. Koch, A.B., Washington University, 1936; M.D., 1940.

Robert C. Kolodny, B.A., Columbia University, 1965; M.D., Washington University, 1969.

Phillip E. Korenblat, M.D., University of Arkansas, 1960.

Ralph F. Kuhlman, M.D., University of Illinois, 1964.

Daniel K. Lane (Dermatology), B.A., Princeton University, 1955; M.D., Washington University, 1959.

Joseph Levitt, M.D., Washington University, 1949.

Morton Allan Levy, B.A., University of California at Los Angeles, 1957; M.D., Washington University, 1961.

David M. Lieberman, M.D., Vanderbilt University, 1949.

Warren M. Lonergan, A.B., Westminster College, 1936; M.D., Vanderbilt University, 1940.

Carl A. Lyss, A.B., Washington University, 1952; B.S., 1952; M.D., 1956.

William E. Magee, M.D., Duke University 1950.

Thomas F. Martin, B.S., St. Louis University, 1961; M.D., 1965. (See Biomedical Computer Laboratory)

Richard W. Maxwell, A.B., Greenville College, 1932; M.D., University of Chicago, 1937.

Oliver A. McKee (Dermatology), L.R.C.P., Royal College of Physicians and Surgeons (Dublin), 1949; S.M., 1949.

Edward J. Miller, B.A., St. John's University, 1958; M.D., St. Louis University, 1962. (See Department of Preventive Medicine and Public Health)

Austin F. Montgomery, M.D., University of Pittsburgh, 1954.

Arlen E. Morrison, A.B., Washington University, 1954; M.D., 1958.

Frede Mortensen, B.A., Wagner College, 1949; M.D., New York Medical College, 1953.

Leonard N. Newmark, A.B., Washington University, 1956; M.A., 1959; M.D., 1963.

Gordon Newton, M.D., University of Arkansas, 1958.

Lamar H. Ochs, A.B., Washington University, 1941; M.D., 1944.

M. Norman Orgel, B.S., College of City of New York, 1929; M.A., Harvard University, 1930; M.D., Washington University, 1934.

S. Michael Orgel, B.A., Washington University, 1960; M.D., St. Louis University, 1965.

Robert F. Owen, B.A., Princeton University, 1948; M.D., Yale University, 1952.

Vincent J. Proskey, B.S., University of Detroit, 1954; M.D., Marquette University, 1964.



Lester T. Reese (Dermatology), M.D., Tulane University, 1965.

Samuel E. Schechter, M.D., Washington University, 1941.

John Wickham Seddon, Ph.B., Yale University, 1931; M.D., Washington University, 1935.

John Blasdel Shapleigh II, M.D., Washington University, 1946.

John Spalding Skinner, M.D., Washington University, 1940.

Ross B. Sommer, A.B., Miami University, 1949; M.D., Cornell University, 1949.

John C. Soucy, Jr., B.S., University of Notre Dame, 1957; M.D., St. Louis University, 1961.

Alan R. Spivack, B.A., Washington University, 1960; M.D., St. Louis University, 1964.

Robert M. Taxman, A.B., Washington University, 1960; M.D., 1964.

J. Allen Thiel, B.S., Rockhurst College, 1956; M.D., St. Louis University, 1960.

James W. Walsh, A.B., Washington University, 1950; M.D., 1954.

Hugh R. Waters, B.S., Northwestern University, 1942; M.D., Washington University, 1945.

Herbert C. Wiegand, A.B., Washington University, 1940; M.D., 1943.

Charles A. Winterling, B.A., Oberlin College, 1954; M.D., University of Rochester, 1958. (On leave of absence)

Edward M. Wolfe (Dermatology), B.A., Hobart College, 1956; M.D., Washington University, 1960.

James A. Wood, A.B., Westminster College, 1947; M.D., Washington University, 1949.

Sharon E. Carmody, B.A., Webster College, 1960 (St. Louis V.A. Hospitals)

Margaret W. Erlanger, B.A., University of Iowa, 1932; M.S., 1938. (St. Louis V.A. Hospitals)

Walter T. Gregory, B.S., St. Louis University, 1960.

Foster Harris, B.A., University of Missouri, 1969.

Kenneth O. Henderson (Dermatology), B.S., University of Missouri, St. Louis, 1971.

Adrian C. Herington, B.Sc., Monash University (Australia), 1969.

Paul F. Huebner, B.S., Southeast Missouri State College, 1963; M.S., 1968.

Mary C. Johnson, A.B., Washington University, 1938.

Sook Won Lee, B.S., Seoul National University (Korea), 1957; M.S., George Peabody College, 1962. (Jewish Hospital)

Odessa Owens

Claire K. Pedersen, B.S., Quincy College, 1948.

Betty F. Perry, A.B., Washington University, 1945. (St. Louis V.A. Hospitals)

James E. Purifoy, Jr., B.S., Washington University, 1969. (St. Louis V.A. Hospitals)

Elaine V. Rieders, B.A., Hunter College, 1948.

Jean E. Russell, B.A., Cornell College, 1965; Ph.D., Rice University, 1970. (Jewish Hospital)

Doris Thompson, B.S., Mississippi State University, 1942.

Jessie T. Yates, B.S., Fisk University, 1956.

Research Assistants

Elizabeth M. Bruns, B.A., University of San Diego, 1966; Ph.D., St. Louis University, 1972. (Jewish Hospital)

Assistants (Clinical)

John E. Mullins, M.D., Washington University, 1958.

John S. Schoentag (Dermatology), A.B., University of Missouri, 1956; M.D., Washington University, 1960.

Department of Microbiology

The Department teaches a one-semester introductory course in microbiology for first-year medical students and for graduate students. The course is concerned particularly with principles of microbial physiology and genetics, and of immunology and, through a limited survey of pathogenic bacteria, viruses, and fungi, attempts to prepare medical students for more advanced study of infectious diseases later in the curriculum. The Department also offers a number of advanced elective research activities. A limited number of summer research fellowships is available.

FIRST YEAR

531. Microbiology. Lectures and laboratory. This course presents the basic principles relating to the growth and reproduction of bacteria and viruses and to the immune responses of the host to diverse substances, including pathogenic microbes and their metabolic products. The sequence followed is: immunology, microbial physiology and genetics, a survey of pathogenic bacteria and fungi, virology. The immunology part of the course emphasizes structure, function, and biosynthesis of antibodies, and provides an introduction to cell-mediated immune responses. In terms of these concepts, specific groups of pathogenic organisms and viruses are considered. The interaction between host and parasite is studied by analyzing wherever possible the molecular basis for the pathogenicity of the microbe and for the immune reactions of man. The factors that make microorganisms vulnerable or resistant to chemotherapeutic agents are emphasized. Credit, lectures 5 units; laboratory 1 unit.

(Dr. Eigner and Staff)



Elective Courses

At present the primary enrollees in these courses are students working for a Ph.D. degree in one of the basic sciences. However, these courses are recommended for interested medical students, especially those who may be considering a career in medical research. Emphasis is placed on the organization and function of living systems at the molecular level. The courses combine formal lectures with student-directed seminars. In the latter, each student has an opportunity to integrate various disciplines of modern molecular biology into the area of biology or medicine that is of particular interest to him. Current courses are:

592. Molecular Biology of Chromosomes. (Spring, 1974.) Emphasis on mammalian cells. Topics to be covered: mitosis, meiosis, chromosome movement and the mitotic ap-

paratus, eu- and heterochromatin, classes of DNA in the chromosome, recombination, methods for localization of genes on chromosomes, chromosomal proteins, the chromosome in differentiation, recognition of specific chromosomes, interspecies hybridization, genetic engineering. Credit 3 units.

(Dr. Apirion)

593. *Nucleic Acids and the Biosynthesis of Proteins.* (Spring, 1975.) Mechanisms of the biosynthesis of nucleic acids and proteins. Specialized aspects in higher organisms are considered. Credit 3 units.

(Dr. D. Schlessinger)

594. *Antibodies: Structure, Function and Formation.* (Spring, 1974.) The principal features will be examined in lectures, assigned reading of current research papers, and in student seminar presentations. Emphasis will be placed on the genetic and molecular events which govern the appearance of lymphocyte receptor and serum antibodies during the immune response. Credit 2 units.

(Drs. Fleischman, Little)

595. *Molecular Biology of Bacterial Viruses.* (Fall, 1973.) Structure of bacterial viruses and metabolism of the infected cell, with emphasis on the genetics of host and virus controlled functions. Relationships of virus to cell, e.g., lysogeny, immunity, and virulence, with emphasis on λ and T-even bacteriophages. Lectures and seminars. Credit 3 units.

(Dr. Kennell)

596. *Topics in Animal Virology.* (Fall, 1974.) Molecular biology and DNA and RNA animal viruses, with emphasis on viral replication and transformation in animal cell culture and slow virus diseases in animals. Credit 3 units.

(Drs. M. Schlesinger, S. Schlesinger)

Clinical Immunology. (Fall, 1973.) Immunization; immune deficiency states; immunological diseases; cellular hypersensitivity; complement in human diseases; cancer immunology-viral tumors; adaptive immunity; immunotherapy; drug sensitivity; transplantation rejection; autoimmunity; transfusion reactions; asthma; serum sickness and hemolytic anemia.

(Dr. Parker)

Research Electives

590. *Research.* These electives acquaint the student with the analyses that are used in present-day biomedical research, especially at the molecular level. Although the subject matter is mostly restricted to microbial systems or to the immune response, the experience should provide useful training for later research in any area of modern biological or clinical research.

(Staff)

Genetic and biochemical analyses of protein synthesis and RNA metabolism in bacteria and mammalian cell cultures. (Dr. Apirion)

Lymphocyte receptor molecules; role of T lymphocytes in B cell differentiation.

(Dr. Davie)

Host-induced modification and restrictions of bacteriophage.

(Dr. Eigner)

Structure and biosynthesis of antibodies; molecular genetics of antibody formation.

(Dr. Fleischman)

Biochemistry of tumor viruses. (Dr. Gelb)

The genetics and immunology of tissue transplantation.

(Dr. Graff)

Biochemistry and genetics of macromolecule regulation in bacteria, in bacteriophage infection, and in cultured mammalian cells.

(Dr. Kennell)

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Immune lytic mechanism; molecular basis of complement action. (Dr. Kinsky)

Immunology and chemistry of the medically important fungi; host-parasite interaction of opportunistic fungal diseases.

(Drs. Kobayashi, Medoff)

Antigenic structure of animal viruses.

(Dr. Liebhaver)

The structure and biosynthesis of lymphocyte cell surface antigens and lymphocyte triggering mechanisms.

(Dr. Little)

Alterations of oxidative carbohydrate metabolism in the change from extracellular to intracellular parasitism.

(Dr. Marr)

Development of therapy for intracellular bacterial and fungal infections.

(Drs. Kobayashi, Medoff)

Cellular immunology, drug hypersensitivity, immune tolerance, radioimmunoassays, and tumor immunology.

(Dr. Parker)

Interactions between RNA animal viruses and their host cells. Emphasis on maturation and assembly of viral proteins.

(Dr. M. Schlesinger)

Structure and replication of enveloped RNA animal viruses.

(Dr. S. Schlesinger)

Metabolism of RNA and polyribosomes in bacteria and mammalian cells.

(Dr. D. Schlessinger)

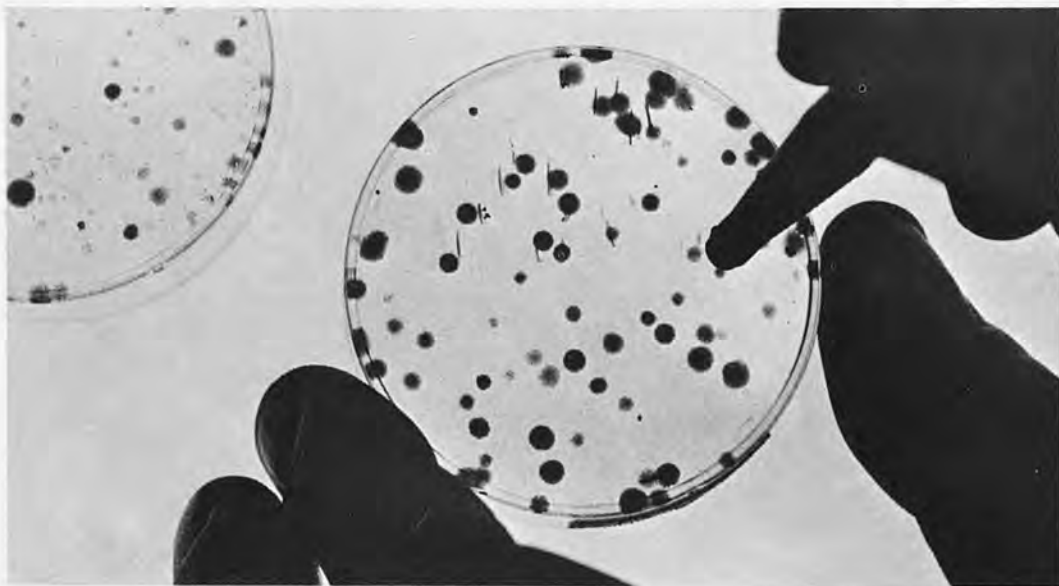
Structure and function of immunoglobulins using myeloma proteins as models. Emphasis on understanding the immune response of syngenetic hosts to myeloma proteins and to the cells responsible for their secretion.

(E. Simms)

Clinical microbiology, anaerobes, endogenous infections.

(Dr. Sonnenwirth)

Note—The number preceding the course title indicates that the course carries credit in the Graduate School of Arts and Sciences.



Professors

David E. Kennell, A.B., University of California, 1955; Ph.D., 1959.

Stephen C. Kinsky, A.B., University of Chicago, 1951; Ph.D., Johns Hopkins University, 1957. (See Department of Pharmacology)

Milton J. Schlesinger, B.S., Yale University, 1951; M.S., University of Rochester, 1953; Ph.D., University of Michigan, 1959.

David Schlessinger, B.A., University of Chicago, 1955; B.S., 1957; Ph.D., Harvard University, 1961.

Associate Professors

David Apirion, M.S., Hebrew University of Jerusalem, 1960; Ph.D., University of Glasgow, 1963.

Joseph M. Davie, A.B., Indiana University, 1962; M.A., 1964; Ph.D., 1966; M.D., Washington University, 1968. (See Department of Pathology)

J. Russell Little, Jr., A.B., Cornell University, 1952; M.D., University of Rochester, 1956. (See Department of Medicine) (Jewish Hospital)

Charles W. Parker, M.D., Washington University, 1953. (See Department of Medicine)

Sondra Schlesinger, B.S., University of Michigan, 1956; Ph.D., 1960.

Ernest S. Simms.

Alexander C. Sonnenwirth, A.B., University of Nebraska, 1950; M.S., Purdue University, 1953; Ph.D., Washington University, 1960. (See Department of Pathology) (Jewish Hospital)

Assistant Professors

Joseph Eigner, A.B., Dartmouth College, 1955; A.M., Harvard University, 1958; Ph.D., 1960.

Julian B. Fleischman, B.S., Yale University, 1955; Ph.D., Harvard University, 1960.

Lawrence D. Gelb, B.S., University of Michigan, 1960; M.D., Harvard Medical School, 1963. (Department of Medicine)

Ralph J. Graff, A.B., Washington University, 1957; M.D., 1957. (See Department of Surgery.)

George S. Kobayashi, B.S., University of California, 1952; Ph.D., Tulane University, 1963. (See Department of Medicine)

Harvey Liebhaber, A.B., New York University, 1953; M.D., 1957. (See Department of Medicine) (Jewish Hospital)

J. Joseph Marr, B.S., Xavier University, 1959; M.D., Johns Hopkins University, 1964; M.S., St. Louis University, 1968. (See Department of Medicine)

Gerald Medoff, A.B., Columbia College, 1958; M.D., Washington University, 1962. (See Department of Medicine)

Research Assistants

John Courtney, A.B., University of Illinois, 1953.

Leonard Keay, B.Sc., Queen Mary College, London, 1953; Ph.D., 1955; M.Sc., University College, London, 1956.

Department of Neurology



Neurology concerns itself with the diseases of brain, spinal cord, peripheral nerves, and muscles. An introduction to the anatomy and physiology of the nervous system is presented in the first-year course in Neural Sciences provided by the Departments of Anatomy and Physiology and Biophysics. In the second year the Department is the major contributor to an interdepartmental course in pathophysiology of nervous system disorders. Here

the interrelationships are demonstrated between knowledge derived from basic investigative and from clinical sources. In addition there are lectures and exercises with patients in neurological physical diagnosis. Third-year activities are based in a full-time inpatient and outpatient clerkship. In the fourth year there are opportunities for clinical externship and for investigation of nervous system functioning in every aspect.

SECOND YEAR

Neurological Examination in Clinical Diagnosis (part of course in Physical Diagnosis). Lectures, demonstrations, and practice examinations of neurological patients.

(Drs. Eliasson, Klinkerfuss, and Staff)

Pathophysiology of Nervous System Disorders (part of course in Pathophysiology). A collaborative sequence with other clinical and basic science departments concerned with diseases of the nervous system. Lectures and seminar-symposia.

(Drs. Eliasson, Hardin, and Staff)

THIRD YEAR

Neurology. A full-time, three-week clerkship is provided on the ward and private services at Barnes Hospital. Patients are assigned to students, who follow them with the resident staff and discuss them regularly in conferences with the senior staff. Students also work in the Neurology Clinic under staff supervision.

(Drs. Eliasson, Landau, and Staff)

FOURTH YEAR

Electives

Neurological Research. A twelve-week elective is available in several areas: electron microscopy of the nervous system, clinical experimental neurophysiology, neurochemistry, and other areas. Facilities are available for qualified students in any year to undertake original research in the laboratories of the Department or in the clinics and wards.

(Dr. Landau and Staff)

Clinical Neurology. A six-week elective neurology clerkship is offered at Starkloff Hospital. There the student works as a member of the clinical team and assumes responsibility for patients. Formal teaching conferences are provided in addition to regular teaching rounds.

(Drs. Chesanow, Dooley, Mejia, and Staff)

Staff Conferences. Students are invited to attend the conjoint neurological conference (neuropathology, neuroradiology, medical neurology, pediatric neurology, and neurological surgery) held on Wednesday afternoon. The neuropathology section is conducted in the Pathology Amphitheatre at 1:30 p.m., and the clinical section in Clopton Amphitheatre at 2:45 p.m. On the second Wednesday of each month, the joint conference is held at City Hospital at 2:00 p.m. in the third floor conference room. Neuropathology brain cutting conferences are held in the Pathology Amphitheatre on Monday at 1:00 p.m. and in the Starkloff Hospital autopsy conference room on Thursday at 12:30 p.m. The neurology research seminars are held at noon on Wednesday in the Department library, eighth floor, McMillan Hospital.

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Professor and Head of Department

William M. Landau, M.D., Washington University, 1947.

Professors Emeriti

George H. Bishop, A.B., University of Michigan, 1912; Ph.D., University of Wisconsin, 1920. (Lecturer in Neurophysiology)

James L. O'Leary, B.S., University of Chicago, 1925; Ph.D., 1928; M.D., 1931. (Also Lecturer) (See Department of Surgery)

Professors

Philip R. Dodge, M.D., University of Rochester, 1948. (See Department of Pediatrics)

Sven G. Eliasson, Ph.D., University of Lund (Sweden), 1952; M.D., 1954. (See Irene Walter Johnson Institute of Rehabilitation)

Professors (Clinical)

Leonard Berg, A.B., Washington University, 1945; M.D., 1949.

Irwin Levy, A.B., Cornell University, 1927; M.D., St. Louis University, 1931; D.M.S., Columbia University, 1935.

Associate Professor Emeritus

Ethel Ronzoni Bishop (Biochemistry), B.S., Mills College, 1913; A.M., Columbia University, 1914; Ph.D., University of Wisconsin, 1922.

Associate Professors

Lawrence A. Coben, B.S., Western Reserve University, 1948; M.D., 1954; M.A., Northwestern University, 1951.

George H. Klinkerfuss, A.B., Washington University, 1952; M.D., 1956.

Alan L. Pearlman, A.B., State University of Iowa, 1958; M.D., Washington University, 1961. (Gordon R. and Thelma B. Coates Scholar in Neurology) (See Department of Physiology and Biophysics)

Arthur L. Prensky, A.B., Cornell University, 1951; M.D., New York University, 1955. (See Department of Pediatrics)

Associate Professor Emeritus (Clinical)

Andrew B. Jones, M.D., Vanderbilt University, 1916.

Assistant Professors

John E. Brooks, M.B., Ch.B., Victoria University of Manchester, 1958. (See Irene Walter Johnson Institute of Rehabilitation)

Robert L. Chesanow, B.S., Union College, 1955; M.D., Albany Medical College, 1960. (Starkloff Hospital)

Darryl C. DeVivo, B.A., Amherst College, 1959; M.D., University of Virginia, 1964. (See Departments of Pediatrics)

James A. Ferrendelli, A.B., University of Colorado, 1958; M.D., 1962. (See Department of Pharmacology)

Marvin A. Fishman, B.S., University of Illinois, 1959; M.D., 1961. (See Department of Pediatrics)

Joseph Hanaway, B.S., McGill University, 1956; M.D., 1960; C.M., 1960. (See Department of Anatomy)

William B. Hardin, B.A., Rice University, 1953; M.D., University of Texas, 1957.

Hugo Mejia, B.A., St. Tomas de Aquino (Bogata), 1955; M.D., National University of Colombia (Bogata), 1963. (Starkloff Hospital)

Marcus E. Raichle, B.S., University of Washington, 1960; M.D., 1964. (See Department of Radiology)

Joseph J. Volpe, B.A., Bowdoin College, 1960; M.D., Harvard University, 1964. (See Department of Pediatrics)



Warren A. Weinberg, B.A., Vanderbilt University, 1956; M.D., 1959. (See Department of Pediatrics)

Research Assistant Professor

Margaret H. Clare (Neurophysiology) B.S.Ed., Southeast Missouri State Teachers College, 1941; M.A., Washington University, 1951.

Assistant Professor Emeritus (Clinical)

Archie D. Carr, B.S., Washington University, 1918; M.D., 1921.

Assistant Professors (Clinical)

Joseph M. Dooley, Jr., M.D., St. Louis University, 1958.

Herbert E. Rosenbaum, B.S., University of Oregon, 1947; M.D., 1949.

Earl R. Schultz, A.B., Southeast Missouri State College, 1952; B.S. in Medicine, University of Missouri, 1953; M.D., Washington University, 1955. (See Department of Psychiatry)

Stuart Weiss, A.B., Washington University, 1950; M.D., 1954.

Research Instructor

Charles P. Hughes, B.A., Yale University, 1960; M.D., Case Western Reserve University, 1964.

Instructor (Clinical)

Robert J. Mueller, M.D., Washington University, 1936; M.S., University of Michigan, 1942.

Research Assistants

Joseph Inukai (See Surgery)

JoAnne D. Scarpellini

Lloyd N. Simpson

Jeanne M. Smith

Department of Obstetrics and Gynecology



The student's involvement in obstetrics and gynecology consists of a thorough exposure to the basic concepts in reproductive biology and an active participation in the delivery of medical care to women with gestations normal or at risk, congenital anomalies of pelvic viscera, structural disorders secondary to difficult childbirth, reproductive endocrinopathies and infertility, and gynecologic malignancies. The entire junior clerkship is conducted in the East Pavilion of Barnes Hospital. Senior electives may be taken at Barnes Hospital or in the many affiliated hospitals in St. Louis. Regularly held conferences in reproductive biology, perinatal medicine, Ob-Gyn pathology and oncology supplement the student's education.

SECOND YEAR

The sophomore is introduced to Obstetrics and Gynecology with lectures in reproductive biology touching on pelvic anatomy, physiology of tubal transport and ovarian control, myometrial function, placental perfusion and steroidogenesis.

THIRD YEAR

Students are each assigned to a resident-senior staff team, and the residents and staff physicians serve as preceptors during the student's six-week stay in the Department. Every woman seen in the office or cared for in the hospital by the team of physicians is considered in her entirety. Attention is paid to the manner in which her social and economic situation has modified her response to disease. Environmental manipulation, in addition to the traditional ways of medical care, is resorted to in attempting to improve her health. The team method ensures that personalized care is given by arranging for the same group of physicians to meet a woman's health needs during each visit. The residents in a team function like a group in Obstetrics and Gynecology practice, and the student works like an intern in the specialty. He sees patients in the office with his resident group, attends deliveries, assists in surgery, and goes to conferences and night call with them.

FOURTH YEAR

Seniors wishing to take an externship or research elective can choose from a variety of courses:

Ob-Gyn Externships

Endocrinology-Infertility Externship. In the office and hospital, the extern participates in

the study and treatment of women with reproductive endocrine disorders and infertility. He presents patients in conferences, has assigned reading, and obtains experience in the techniques of steroid and gonadotropin quantitation as well as various manipulative procedures. (Dr. Warren)

Pathology Externship. The elective elucidates the principles of anatomic pathology as applied to operative material in Obstetrics and Gynecology. The extern examines gross and microscopic specimens in the Ob-Gyn pathology laboratory and reviews pertinent literature with a senior pathologist. (Dr. Dehner)

Perinatal Medicine. Electronic and biochemical surveillance of the human fetus and mother before and during parturition. The extern is involved in the care of women with gestations at risk (i.e., diabetes, hypertension, toxemia, renal disease, fetopelvic disproportion, etc.). (Dr. Villanueva)

General Ob-Gyn Externships

Homer G. Phillips Hospital	(Dr. Monat)
Jewish Hospital	(Dr. Rothman)
St. Luke's Hospital	(Dr. Williams)

The externship in each of these affiliated hospitals allows the student a greater degree of participation and responsibility in the care of patients. There is a wealth of clinical material in each of these facilities.

Maternal and Infant Care Externship. Based at the Jefferson-Cass Health Center, the M.I.C. externship provides the student with experience in the delivery of comprehensive outpatient care to women with gestations or infants at risk, ante- and post-partum. The project operates an effective outreach program. (Dr. Smiley)

Research Electives

Molecular Aspects of Endocrinology and Population Control. The research involves the study of the topography of macromolecular steroid binding sites, evaluation of the role of steroid "receptor" proteins in molecular mechanisms of steroid action and the synthesis of affinity-labeling steroids and anti-steroids, and their application to disease states and population control. (Dr. Warren)

Steroids in Reproductive Physiology. The endeavor examines the qualitative and quantitative nature of steroidogenesis in the ovary and the eventual secretion of steroid hormones from the gland. Definition of the role of progesterone in the establishment and maintenance of pregnancy in the human and in experimental animals is also attempted. (Dr. Wiest)

Myometrial and Tubal Physiology. Continuous monitoring of intrauterine pressure during medically-induced labor at term and legal abortions elucidate certain functional uterine disorders and the mechanism of action of some labor-provoking drugs. Investigations in oviduct physiology and "model" experiments in laboratory animals promote the understanding of the basic laws of function and regulation of the reproductive tract. (Dr. Csapo)

Ultrastructure of the Reproductive Tract. This research involves the application of electron microscopic techniques to the study of human reproduction and contraception. It contributes to a clearer understanding of cell regeneration and the effects of endogenous sex steroids on target tissues. (Dr. Friedrich)

Professor and Head of the Department

James C. Warren, A.B., University of Wichita, 1950; M.D., University of Kansas, 1954; Ph.D., University of Nebraska, 1961. (See Department of Biological Chemistry)

Professor Emeritus

Willard Myron Allen, B.S., Hobart College, 1926; M.S., University of Rochester, 1929; M.D., 1932; Sc.D. (hon.), 1957; Sc.D. (hon.), Hobart College, 1940.

Professors

Arpad I. Csapo, M.D., University of Szeged (Hungary), 1941.

Walter G. Wiest, A.B., Brigham Young University, 1948; Ph.D., University of Wisconsin, 1952. (See Department of Biological Chemistry)

Professors Emeriti (Clinical)

John E. Hobbs, A.B., Southwest Missouri State Teachers College, 1923; M.D., Washington University, 1927.

Melvin A. Roblee, B.S., Washington University, 1923; M.D., 1925.

Grandison D. Royston, M.D., Washington University, 1907.

Samuel D. Soule, M.D., Washington University, 1928.

Professors (Clinical)

A. Norman Arneson, B.S., Texas Christian University, 1924; M.D., Washington University, 1928. (See Department of Radiology)

William H. Masters, B.S., Hamilton College, 1938; M.D., University of Rochester, 1943.

Associate Professors

H. Marvin Camel, M.D., Creighton University, 1950.

Ernst R. Friedrich, M.D., University of Heidelberg, 1954.

George J. L. Wulff, Jr. A.B., Washington University, 1929; M.D., 1933.

Associate Professor Emeritus (Clinical)

F. P. McNalley, B.S., Washington University, 1915; M.D., 1917.

Assistant Professors

Louis P. Dehner, A.B., Washington University, 1962; M.D., 1966. (See Department of Pathology)

Ming-Shian Kao, M.D., National Taiwan University Medical College, 1961.

Laurence E. Maze, M.D., Washington University, 1948. (See Division of Health Care Research)

Shlomo Mannor, M.D., Hebrew University (Israel), 1963.

Jacques Sauvage, B.S., University of Liege, 1948; M.D., 1957.

Frederick Sweet, B.S., City University of New York, 1960; Ph.D., University of Alberta, 1968.

Research Assistant Professors

Irving Boime, B.S., St. Louis College of Pharmacy, 1964; M.S., Purdue University, 1966; Ph.D., Washington University, 1970. (See Department of Pharmacology)

Kenneth Polakoski, B.S., Wisconsin State University, 1966; M.S., University of Georgia, 1971; Ph.D., 1972.

B. Ramanath Rao, B.S., University of Madras, 1957; M.S., University of Baroda, 1962; Ph.D., University of Utrecht, 1967.

Thomas S. Ruh, A.B., Gonzaga University, 1963; Ph.L., 1964; M.S., Marquette University, 1968; Ph.D., 1969.

Assistant Professor Emeritus (Clinical)

Kevin C. Morrin, M.B., B.Ch., National University of Ireland, 1921.

Assistant Professors (Clinical)

William Berman, A.B., Washington University, 1931; M.D., 1935.

Arthur R. Bortnick, M.D., Washington University, 1935.

Robert Burstein, M.D., Washington University, 1948.

Arthur T. Esslinger, M.D., Washington University, 1940.

Charles R. Gulick, A.B., Central College, 1940; M.D., St. Louis University, 1943.

A. Herman Hutto, A.B., University of Alabama, 1932; M.D., Washington University, 1935.

Frank B. Long, Jr., M.D., Washington University, 1947.

J. Barlow Martin, B.A., Amherst College, 1951; M.D., Washington University, 1955.

Seymour M. Monat, A.B., University of Pennsylvania, 1935; M.D., Long Island College, 1939.

Norman K. Muschany, A.B., Westminster College, 1947; M.D., Temple University, 1951.

James Pennoyer, B.S., Hobart College, 1933; M.D., University of Rochester, 1939.

David Rothman, B.S., Washington University, 1935; M.D., 1935.

Willard C. Scrivner, B.S., Washington University, 1926; M.D., 1930.

William L. Smiley, A.B., Ohio State University, 1933; M.D., 1937.

Helman C. Wasserman, A.B., Johns Hopkins University, 1928; M.D., Washington University, 1932.

Carol F. Williams, B.A., University of Tennessee, 1952; M.D., 1955.

Seth E. Wissner, A.B., Washington University, 1942; M.D., 1945.

Instructors

Oscar H. Bolch, Jr., A.B., University of North Carolina, 1957; M.D., 1962.

James P. Crane, A.B., University of Indiana, 1966; M.D., 1970.

Chotchai Srisuro, M.D., Faculty of Medical Sciences (Thailand), 1967.

Ronald P. Wilbois, B.S., University of Illinois College of Pharmacy, 1959; M.D., Illinois College of Medicine, 1964.

Research Instructors

Chang-chen Chin, B.S., National University (China), 1944; Ph.D., Oklahoma State University, 1966.

Steven Clark, B.S., Kansas State University, 1965; Ph.D., University of Kansas, 1970.

Instructors Emeriti (Clinical)

Hubert L. Allen, A.B., University of Kansas, 1932; M.D., Tulane University, 1936.

Grover B. Liese, A.B., Real-Gymnasium (Cassel, Germany), 1910; M.D., University of Heidelberg, 1918.

Paul F. Max, B.S., Washington University, 1932; M.D., 1932.

Frances H. Stewart, M.D., Washington University, 1927.

Instructors (Clinical)

Joe E. Belew, A.B., Central College, 1953; M.D., St. Louis University, 1957.

Bryce H. Bondurant, A.B., Northeast Missouri State Teachers College, 1936; D.O., Kirksville College of Osteopathy and Surgery, 1940; M.D., Washington University, 1943.

Robert S. Cohen, B.S., Union College, 1958; M.D., State University of New York, 1962.

Raymond C. Doucette, A.B., Bowdoin College, 1960; M.D., C.P.M., McGill University Faculty of Medicine, 1964.

Robert H. Duemler, A.B., Washington University, 1952; M.D., 1956.

S. Michael Freiman, A.B., Montana State University, 1951; M.D., Washington University, 1955.

Ira Clyde Gall, B.S., University of Cincinnati, 1948; M.D., 1951.

Robert S. Goell, A.B., Middlebury College, 1949; A. M., University of Pennsylvania, 1950; M.D., Washington University, 1960.

Godofredo M. Herzog, B.S., Louisiana State University, 1953; M.D., Washington University, 1957.

S. Robert Kovac, A.B., Washington University, 1960; M.D., University of Missouri, 1964.

Justin F. Kraner, M.D., University of Michigan, 1949.

Theodore Merrims, A.B., Washington University, 1949; M.D., 1954.

Jerry N. Middleton, B.A., Westminster College, 1959; M.D., Washington University, 1963.

Sam Momtazee, M.D., Shiraz Medical School (Iran), 1961.

Nathaniel H. Murdock, B.S., Harvard University, 1958; M.D., Meharry Medical College, 1963.

Ivan T. Myers, B.A., University of Missouri, 1958; M.D., University of Missouri Medical School, 1963.

Gerald Newport, A.B., Washington University, 1948; M.D., 1953.

Joseph D. O'Keefe, A.B., University of Colorado, 1946; M.D., Washington University, 1950.

Harry E. Raybuck, Jr., A.S., Westminster College, 1949; M.S., St. Louis University, 1951; Ph.D., 1953; M.D., Medical College of Georgia, 1959.

Jonathan R. Reed, B.A., Fisk University, 1956; M.D., Meharry Medical College, 1965.

Marvin Rennard, A.B., Washington University, 1947; M.D., 1952; B.S., University of Missouri, 1950; M.S., 1950.

Alexander M. Roter, A.B., University of Illinois, 1948; M.D., 1951.

James Sawyer, A.B., Ohio State University, 1949; M.D., 1951.

Melvin M. Schwartz, A.B., University of Nebraska, 1945; M.D., 1947.

Arthur A. Smith, M.D., St. Louis University, 1958.

Herman Taute, M.D., Philipps University (Marburg/Lahn, West Germany), 1954.

Eugene D. Taylor, B.S., Virginia State College, 1948; M.D., Howard University, 1954.

M. Bryant Thompson, M.D., University of California, 1961.

Bernice A. Torin, A.B., Washington University, 1937; M.D., 1941.

J. Leslie Walker, M.D., University of Tennessee, 1960.

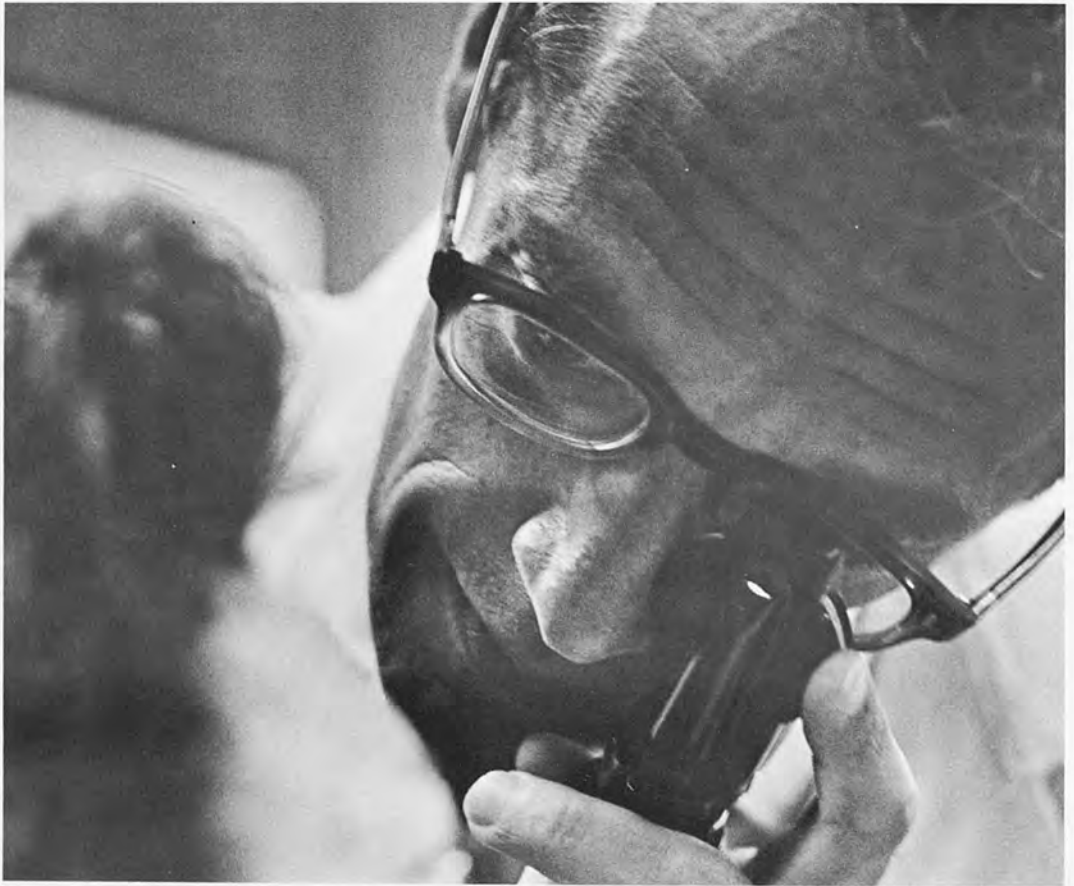
Sol Weisman, A.B., Washington University, 1928; M.D., 1932.

Parker H. Word, B.S., Virginia State College, 1941; M.D., Howard Medical School, 1944.

Mitchell Yanow, M.D., Washington University, 1941.



Department of Ophthalmology



Instruction begins in the second year with methods of examination of the eye. Emphasis is placed on the use of the ophthalmoscope. During the second year a series of nine didactic lectures is given as an introduction to various aspects of ocular disease. During the third year students are assigned to an ophthalmology clerkship for one week. In the fourth year, a six-week ophthalmology elective is offered to senior students, which affords opportunity for work with patients under supervision.

SECOND YEAR

Ophthalmology. Lectures and demonstrations in the basic principles of ophthalmology. (Staff)

THIRD YEAR

Ophthalmology. All students rotate through the Eye Clinic for a one-week clinical clerkship. (Staff)

FOURTH YEAR

Electives

439. *Seminar.* A course in the basic principles of vision is conducted under the supervision of the departments of Psychology and Ophthalmology. (Dr. Enoch)

Clinical Clerkship in Ophthalmology. One student rotates through the Department of Ophthalmology for six weeks. He is given instruction in the basic principles of an ophthalmologic examination, including slit lamp biomicroscopy, motility evaluation, neuro-ophthalmologic evaluation, perimetry, ophthalmoscopy, tonometry, etc. He assists in the workup of eye patients at the St. Louis Veterans Administration Hospital and in the East Pavilion and attends all rounds and conferences. This elective is primarily geared to the student who plans to enter the specialty of ophthalmology.

Research Electives

Retinal physiology. (Dr. Enoch)

Experimental and clinical research in glaucoma. (Dr. Podos)

Experimental and diagnostic ophthalmic pathology. (Dr. M. Smith)

Experimental research in ocular physiology. (Dr. Moses)

Tissue culture projects. (Dr. Bigger)

Note—The number preceding the course title indicates that the course carries credit in the Graduate School of Arts and Sciences.

Professor and Head of the Department

Bernard Becker, A.B., Princeton University, 1941; M.D., Harvard University, 1944.

Professor

James E. Miller, B.S., Tulane University, 1946; M.D., The Medical College of Alabama, 1949. (See Department of Pediatrics)

Research Professors

Adolph I. Cohen, B.S., City College of New York, 1948; M.A., Columbia University, 1950; Ph.D., 1954. (See Department of Anatomy)

Jay M. Enoch, B.S., Columbia University, 1950; Ph.D., Ohio State University, 1956. (Also Faculty of Arts and Sciences)

Associate Professors

Ronald M. Burde, B.S., Massachusetts Institute of Technology, 1960; M.D., Jefferson Medical College, 1964.

Marguerite A. Constant (Biochemistry), B.S., George Washington University, 1947; Ph.D., University of Wisconsin, 1951.

Allan E. Kolker, A.B., Washington University, 1954; M.D., 1957.

Robert A. Moses, A.B., Johns Hopkins University, 1938; M.D., University of Maryland School of Medicine, 1942.

Steven M. Podos, A.B., Princeton University, 1958; M.D., Harvard University, 1963.

Morton E. Smith, B.S., University of Maryland, 1956; M.D., 1960. (See Department of Pathology)

Research Associate Professor

Nigel W. Daw, B.A., Trinity College (Cambridge), 1956; M.A., 1961; Ph.D., Johns Hopkins University, 1967. (See Department of Physiology and Biophysics)

Associate Professors Emeriti (Clinical)

Bennett Young Alvis, B.S., St. Louis University, 1916; M.D., 1918.

Howard Rommel Hildreth, M.D., Washington University, 1928.

Frederick Oscar Schwartz, M.D., Washington University, 1910.

Associate Professors (Clinical)

Benjamin Milder, M.D., Washington University, 1939.

Edward Okun, M.D., University of Vermont, 1956.

Theodore E. Sanders, B.S., University of Nebraska, 1931; M.D., 1933.

Assistant Professors

John F. Bigger, Jr., A.B., Duke University, 1960; M.D., Washington University, 1964.

Stephen R. Waltman, B.S., Massachusetts Institute of Technology, 1961; M.D., Yale University, 1964.

Assistant Professors (Clinical)

Edmund B. Alvis, M.D., Washington University, 1934.

Stanley C. Becker, A.B., Washington University, 1948; M.A., 1950; Ph.D., 1951; M.D., Chicago Medical School, 1955.

Edward F. Berg, A.B., Washington University, 1960; M.D., 1964.

Daniel Bisno, B.A., University of Wisconsin, 1927; M.D., Johns Hopkins University, 1931.

Isaac Boniuk, B.S., Dalhousie University, 1958; M.D., 1962.

James H. Bryan, A.B., Washington University, 1932; M.D., 1936.

Robert C. Drews, A.B., Washington University, 1952; M.D., 1955.

Jack Hartstein, B.S., University of Missouri, 1953; M.D., University of Cincinnati, 1955.

Glen P. Johnston, A.B., Washington University, 1953; M.D., 1956.

Jack Kayes, B.A., Yale University, 1953; M.D., Washington University, 1957.

William H. Meinberg, B.S., Washington University, 1928; M.D., 1932.

Lawrence T. Post, Jr., M.D., Washington University, 1948.

Harry D. Rosenbaum, M.D., Washington University, 1934.

Philip T. Shahan, A.B., Harvard University, 1938; M.D., Washington University, 1942.

Bernd Silver, B.S., University of Louisville, 1952; M.D., 1956.

H. Phillip Venable, B.S., Wayne State University, 1935; M.D., 1940.

Charles E. Windsor, A.B., Carleton College, 1956; M.D., University of Rochester, 1960.

Research Instructors

Walter J. Grodzki, D.D.S., St. Louis University, 1944.

Elaine Miller, A.B., Judson College, 1944; M.D., Medical College of Alabama, 1949. (See Department of Pediatrics)

Frank L. Tobey, Jr., B.S., University of Michigan, 1947; M.S., 1948; Ph.D., 1962.

Instructors (Clinical)

Nevinkumar J. Amin, I.S.C., Bombay University, 1960; M.B.B.S., 1966.

Neva P. Arribas, M.D., Manila Central University, 1954.

George M. Bohigian, B.A., Washington University, 1961; M.D., St. Louis University, 1965.

Samuel A. Canaan, Jr., A.B., State University of Iowa, 1942; M.D., Meharry Medical College, 1954.

Ruth S. Freedman, A.B., Washington University, 1938; M.D., 1942.

David M. Freeman, A.B., University of Missouri, 1940; B.S., in Medicine, 1941; M.D., Washington University, 1943.

William S. Joffe, A.B., Washington University, 1959; M.D., 1963.

Matthew Newman, A.B., Vanderbilt University, 1956; M.D., Columbia University, 1959.

F. Thomas Ott, B.A., Southern Methodist University, 1963; M.D., Washington University, 1965.

Maxwell Rachlin, M.D., University of Toronto, 1942.

Mickey L. Salmon, M.D., Louisiana State University, 1959.

Arthur W. Stickle, Jr., M.D., University of Oklahoma, 1943.

Evadne M. Titer, B.Sc., Howard University, 1963; M.D., 1967.

Assistant

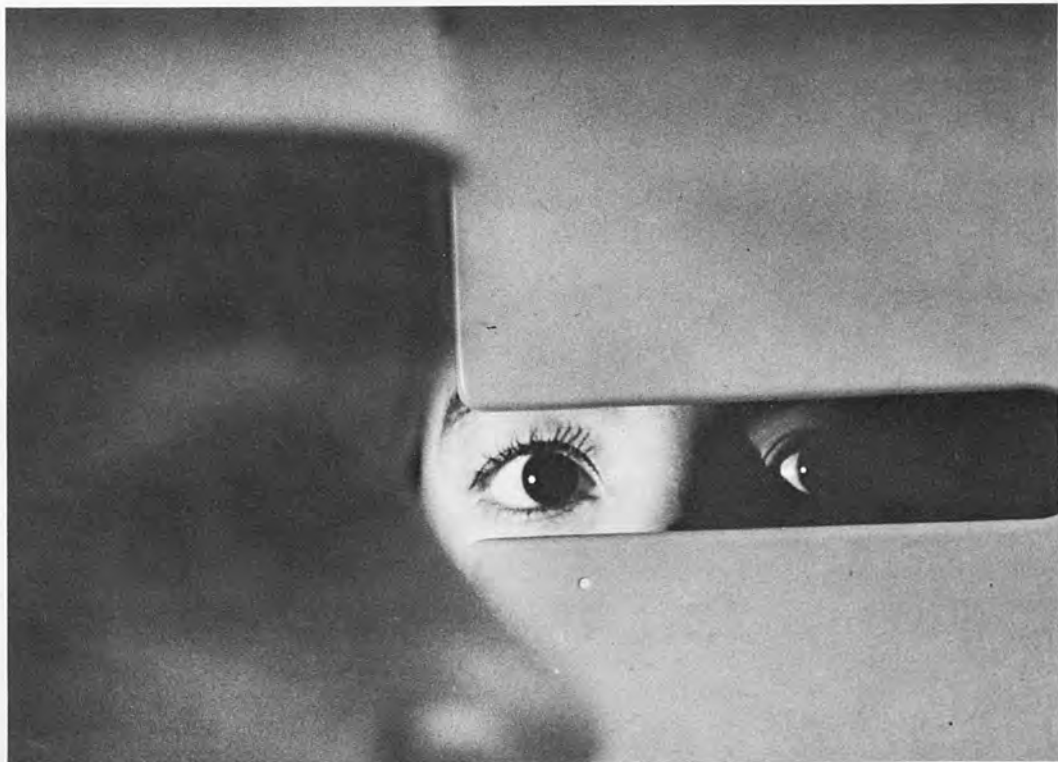
Lisa M. Cibis, M.D., University of Heidelberg, 1939; Certified Orthoptist, Washington University, 1956.

Research Assistants

Dorothy G. Cooper, B.S.N., 1964; M.S.N., 1966.

Nels J. Holmberg, B.S., Oklahoma State University, 1963; M.S., 1966.

Gerald S. Hoover.



Department of Otolaryngology



Otolaryngology is presented to students during their sophomore, junior, and senior years. Clinical pathologic correlation lecture series is presented to the sophomores. In the junior year each student spends two weeks on one of the services in East Pavilion, St. Louis Veterans Administration, Max C. Starkloff, or Homer G. Phillips Hospitals. During this period there is teaching at the bedside, in the operating room, and in the clinic, supplemented by daily afternoon lectures, grand rounds on Thursdays, and an introduction to audiology as well as to basic ENT research.

The ENT rotation is highlighted by a field trip to an outlying community, where a full-time member of the Department evaluates and treats adults and children with common ENT problems. Senior students who show a special interest may take a rotating elective in ENT suited to their interests. Some possibilities include research or clinical work. Ample research facilities and ongoing projects are available. Clinical exposure could include oncologic diseases related to the head and neck, otologic diseases, otoneurology, audiology, or middle ear surgery.

SECOND YEAR

Otolaryngology and Physical Diagnosis. Clinical pathologic correlative lectures in otolaryngology are given to the entire class.

(Dr. Ogura)

THIRD YEAR

Otolaryngology Clerkship. Practical instruction in diagnosis and treatment. Two weeks.

(Dr. May)

FOURTH YEAR

Electives

Structure and Innervation of Labyrinth.

(Dr. Bohne)

Clinical Clerkship. A 4-8 week rotation in areas of otology, laryngology, and head-neck surgery with inpatient and outpatient responsibilities. (Dr. Ogura and Clinical Staff)

Basic Science Review. Fundamental principles of anatomy and physiology of head and neck; lectures and dissection.

(Dr. Harvey and Staff)

Research Electives

Cytology, neurology, and histochemistry of membranous labyrinth. (Dr. Bohne)

Physiology of larynx. (Drs. Ogura, Harvey)

Nasopulmonary physiology. (Dr. Ogura)

Metabolism of the inner ear. Physiological and biochemical aspects. (Dr. Thalmann)

Otoneurology labs. (Dr. Stroud)

Development of otic capsule and ossicles. (Dr. Bohne)

Audiology. (Dr. Carver)

Lindburg Professor and Head of Department

Joseph H. Ogura, A.B., University of California, 1937; M.D., 1941.

Professor Emeritus

Walter P. Covell, B.S., Oregon State College, 1921; M.S., 1923; Ph.D., University of Minnesota, 1926; M.D., University of Chicago, 1933. (See Department of Anatomy)

Professors

S. Richard Silverman (Audiology), A.B., Cornell University, 1933; M.S., Washington University, 1938; Ph.D., 1942. (Also Central Institute for the Deaf and Faculty of Arts and Sciences)

Malcolm H. Stroud, M.B., Ch.B., University of Birmingham, 1945; L.R.C.P., M.R.C.S., 1946; F.R.C.S., 1949.

Ruediger Thalmann, M.D., University of Vienna, 1954.

Research Professor Emeritus and Lecturer

Hallowell Davis, A.B., Harvard University, 1918; M.D., 1922. (See Department of Physiology and Biophysics) (Also Central Institute for the Deaf)

Research Professors

Donald H. Eldredge, S.B., Harvard University, 1943; M.D., 1946. (Also Central Institute for the Deaf and Faculty of Arts and Sciences)

Ira J. Hirsh (Audiology), A.B., New York State College for Teachers (Albany), 1942; M.A., Northwestern University, 1943; M.A., Harvard University, 1947; Ph.D., 1948. (Also Central Institute for the Deaf and Faculty of Arts and Sciences)

90 The School of Medicine

Professor (Clinical)

Ben H. Senturia, A.B., Washington University, 1931; M.D., 1935.

Associate Professors

Joseph E. Harvey (Experimental Otolaryngology), B.A., University of California (Berkeley), 1954; M.A., 1964; Ph.D., 1968. (See Department of Anatomy)

Mark May, B.S., Dickinson College, 1957; M.D., Hahnemann Medical College, 1961.

Lindsay Pratt, B.S., Muhlenberg College, 1949; M.D., Jefferson Medical College, 1953; M.S., Temple University, 1960.

Donald G. Sessions, A.B., Princeton University, 1958; M.D., Washington University, 1962.

Associate Professor Emeritus (Clinical)

French K. Hansel, M.D., St. Louis University, 1918.

Assistant Professors

William A. Alonso, B.A., Amherst, 1960; M.D., Yale University, 1964.

Barbara A. Bohne, B.A., Washington University, 1967; Ph.D., 1971.

William F. Carver (Audiology), B.A., University of Southern California, 1951; M.A., 1955; Ph.D., 1960.

David Crowley (Physiological Acoustics), B.A., Middlebury College, 1961; M.A., University of Vermont, 1963; Ph.D., Princeton University, 1965.

Lyle A. David (Microbiology), B.S., University of Alberta, 1963; M.S., 1965; Ph.D., University of British Columbia, 1968.

Joseph A. Davidenas (Microbiology), B.S., University of Alberta, 1964; Ph.D., 1970.

Sam E. Kinney, B.S., Denison University, 1960; M.D., Western Reserve University, 1964. (Jewish Hospital)

Gershon J. Spector, B.A., Johns Hopkins University, 1960; M.D., University of Maryland School of Medicine, 1964.

Assistant Professors Emeriti (Clinical)

Alfred J. Cone, B.S., State University of Iowa, 1921; M.D., 1923; M.S., 1927.

A. Chesterfield Stutsman, B.S., Roanoke College, 1927; M.D., University of Virginia, 1931.

Robert E. Votaw, B.S., State University of Iowa, 1927; M.D., 1929.

Assistant Professors (Clinical)

Benard C. Adler, B.S., Washington University, 1937; M.D., 1937.

William T. K. Bryan, A.B., Washington University, 1929; M.D., 1933.

Harold M. Cutler, A.B., University of Maine, 1930; M.D., Tufts College, 1937.

Morris Davidson, B.S., Indiana University, 1936; M.D., 1938.

L. Wallace Dean, Jr., B.S., Yale University, 1930; M.D., Washington University, 1933.

Guerdan Hardy, M.D., Washington University, 1929.

Daniel D. Klaff, B.S., University of Virginia, 1933; M.D., 1936. (On leave of absence)

Edward H. Lyman, B.S., Washington University, 1937; M.D., 1937.

Herbert M. Smit, M.D., St. Louis University, 1933.

Wayne A. Viers, B.S., Phillips University, 1952; M.D., University of Oklahoma, 1956.

Joseph W. West, M.D., Duke University, 1944.

Instructor

Pekka J. Ahlstrom, B.N.S., Turku University (Finland), 1970; B.A., 1972; M.A., 1972.

Research Instructor

Marian P. Bryan, A.B., Washington University, 1931.

Instructors (Clinical)

Carl F. Ehrlich, B.S., St. Louis University, 1961; M.D., University of Missouri (Columbia), 1965.

Charles C. Jacobs, B.S., Washington University, 1942; M.D., 1945; Postgraduate, 1948, 1949.

Assistants

Bruce J. Birch (Audiology), B.S., Brigham Young University, 1970; M.S., 1971.

Jacquelyn J. Scorza (Audiology), B.A., Parsons College, 1944; M.A., University of Iowa, 1957.

Research Assistants

David R. Belluci.

Charles D. Carr.

Thomas H. Comegys, B.A., Central Methodist College, 1966.

Judith Ann Crozier, B.Sc., University of London, 1966.

George S. Holtzsch, B.A., Southern Illinois University, 1962; M.A., 1966.

Isolde Thalmann, B.S., Washington University, 1969; A.M., 1972.

Department of Pathology

Pathology for medical students is given during the second, third, and fourth years. In the second year the course covers general and special pathology, and in the third and fourth years students attend clinicopathological conferences conducted in collaboration with clinical departments. Also, in the fourth year students may elect to participate in advanced courses in pathology or to pursue research on some phase of experimental pathology. The Department offers a course of study leading to the Ph.D. degree in experimental pathology. Medical students who desire to combine graduate and medical programs of study should consult Dr. Grisham.

For the purposes of teaching, research, and service, the Department is divided into specialty divisions under the following directors:

Autopsy Pathology
Dr. Kissane

Graduate Programs in Experimental Pathology and Environmental Pathobiology
Dr. Grisham

Laboratory Medicine
Dr. Jarett

Neuropathology
Dr. Torack

Pediatric Pathology
Dr. Kissane

Surgical Pathology
Dr. W. Bauer

SECOND YEAR

501. Pathology. General and special pathology are covered by lectures, gross and microscopic demonstrations, and laboratory work. In general pathology, degenerations,



inflammations, infectious diseases, and tumors are considered. The diseases of each organ system are studied during the time devoted to special pathology. Small groups are given instruction in postmortem technique and in gross pathology. Credit 10 units for the year. (Staff)

THIRD AND FOURTH YEARS

Clinical Pathological Conference. The clinical history and treatment of patients who have died are discussed before the class by the physicians and surgeons of the departments concerned. These conferences afford the students an opportunity to interpret the clinical observations in the light of the postmortem findings. One hour a week during the year. (Staff)

Tumor Conference. One hour each week for twelve weeks during the surgery and ob-

stetrics and gynecology clerkships. Problem cases are presented for illustration and discussion of all aspects of neoplastic disease. (Staff)

Elective Courses

502. Major Research. The Department encompasses all of the major areas of investigation in experimental pathology. Examples include:

Cellular Immunology and Tumor Immunology. (Drs. Davie, Tillack, Lynch, Rosai, Bell)

Environmental and Pulmonary Pathology. (Drs. Kuhn, Hartroft, Askin, G. Davis)

Experimental Neuropathology. (Drs. Torack, Schlaepfer, Nelson)

Experimental Endocrinology and Metabolism. (Drs. Greider, Lacy, Jarrett, Williamson, McDaniel, Teitelbaum, Kostianovsky)

Experimental Pathology of the Liver. (Dr. Grisham)

Experimental Pediatrics and Neonatal Pathology. (Drs. Kissane, Smith)

Neoplasia. (Drs. W. Bauer, Kyriakos, Dehner, Meyer, Perez)

Microbiology and Virology. (Drs. Sonnenwirth, Rabin)

Thrombosis, Coagulation, and Immunohematology. (Drs. Joist, Sherman)

Experimental Osteoarthritis. (Dr. Silberberg)

Computer Technology, Instrumentation, and Clinical Chemistry. (Drs. Kessler, J. Davis, Ladenson, Lewis, Coch, Stevens)

X-ray Crystallography. (Dr. Hoff)

595. Literature Review. The current journals concerned with morphological and experimental pathology and oncology are reviewed by the members of the staff. Properly prepared students may attend or participate. Credit 2 units.

596. Seminar in Gross Pathology. The autopsies for the affiliated hospitals are performed by the junior members of the staff. The entire Department meets, and the cases are evaluated by the senior staff at this conference. Two hours once a week throughout the year. Credit 2 units. (Staff)

597. Seminar in Microscopic Pathology. The microscopic sections from each autopsy are presented by the prosector at a conference. Credit 2 units. (Staff)

598. Endocrine Pathology. A study of disease processes involving the endocrine system, including endocrine functions of the kidney and gastrointestinal system in addition to the classical endocrine glands. Correlation of macromolecular structure and function of both natural disease and experimentally induced conditions is emphasized. Credit 2 units. (Dr. Hartroft and Staff)

Advanced Special Pathology. A series of seminars discussing timely selected topics in special pathology of human disease augmented by illustrative cases and emphasizing clinicopathologic correlations. Reading lists will be circulated and active discussion is encouraged. If the size of the group makes it practical to do so, each student will prepare and conduct a session on a subject of his choice. (Dr. Kissane)

Pathogenesis of Viral and Viral Related Disease. This course covers various areas of

virology such as viruses and cancer, viral hepatitis (Australia antigen), "slow" virus disease, and developmental defects and viruses. The pathogenesis of viruses and how they interact with the host to induce disease will be stressed; morphologic, virologic, and immunologic aspects will be discussed. The group will be small, with informal discussion.

(Dr. Rabin)

Environmental Pathology. Lectures and seminars discussing the effect of modern industrial environment on man's health. The adaptability of man, his ability to manipulate his environment, and the effects of these manipulations in regard to health and disease will be discussed. Topics include acute and chronic diseases associated with air and water pollution, waste disposal, pesticide usage, transportation, and urban living and noise.

(Dr. Davis)

Selected Topics in Immunology and Immunopathology. This seminar course emphasizes those areas which are most applicable to the understanding of human disease states. The subject matter can be selected so as to suit the interest of the student, but will include immune deficiency states, the role of the thymus in immune competence, immunoglobulin structure and function, immunological disorders accompanying neoplasia, tumor immunology, and autoimmune disorders.

(Dr. Lynch)

Neuropathology Seminar. Clinical pathological correlations of neurological diseases will be investigated by the case study method using current and documented material. Participants will partake in gross neuropathological examinations and will be assigned selected cases for discussion of clinical data of gross and microscopic pathological findings, especially in relationship to evolution



and mechanism of disease processes. Topics covered will include vascular, infectious, demyelinating, and neuronal diseases, as well as neoplasms of the nervous system.

(Dr. Torack)

Topics in Laboratory Medicine. A series of twelve seminars over a six-week period covering topics intended to demonstrate the role of laboratory medicine in the diagnosis and therapeutic management of disease.

(Dr. Jarett and Staff)

Note—The number preceding the course title indicates that the course carries credit in the Graduate School of Arts and Sciences.

*Edward Mallinckrodt Professor
and Head of the Department*

Paul E. Lacy, B.A., Ohio State University, 1945; M.D., 1948; M.S., 1948; Ph.D., University of Minnesota, 1955.

Professor Emeritus

Lauren V. Ackerman (Pathology and Surgical Pathology), A.B., Hamilton College, 1927; M.D., University of Rochester, 1932. (Also Consultant)

Professors

Walter C. Bauer, B.S., Ohio State University, 1946; M.D., Washington University, 1954.

Allen C. Enders, A.B., Swarthmore College, 1950; A.M., Harvard University, 1952; Ph.D., 1955. (See Department of Anatomy)

Frederick G. Germuth, Jr., A.B., Johns Hopkins University, 1942; M.D., 1945.

Joe W. Grisham, A.B., Vanderbilt University, 1953; M.D., 1957.

John Kissane, A.B., University of Rochester, 1948; M.D., Washington University, 1952. (See Department of Pediatrics)

Ruth Silberberg, M.D., University of Breslau, 1931.

Richard Torack, B.S., Seton Hall University, 1948; M.D., Georgetown University, 1952. (See Department of Anatomy)

Associate Professors

Joseph M. Davie, A.B., Indiana University, 1962; M.A., 1964; Ph.D., 1966; M.D., Washington University, 1968. (See Department of Microbiology)

Milton N. Goldstein, B.S., Western Reserve University, 1946; M.S., 1947; Ph.D., 1952. (See Department of Anatomy)

Marie H. Greider, B.S., Ohio State University, 1949; M.S., 1955; Ph.D., 1960.

Phyllis M. Hartroft, B.S., University of Michigan, 1949; M.A., University of Toronto, 1951; Ph.D., 1954.

Leonard Jarett (Laboratory Medicine) B.A., Rice University, 1958; M.D., Washington University, 1962. (See Department of Medicine)

Gerald Kessler, B.S., City College of New York, 1950; M.S., University of Maryland, 1952; Ph.D., 1954. (Jewish Hospital)

Charles Kuhn, A.B., Harvard University, 1955; M.D., Washington University, 1959.

Michael Kyriakos, B.S., City College of New York, 1958; M.D., Albert Einstein College of Medicine, 1962.

James S. Nelson, M.D., St. Louis University, 1957. (See Department of Pediatrics)

Erwin R. Rabin, A.B., Washington University, 1952; M.D., 1956. (Jewish Hospital)

Juan Rosai, B.S., Colegio Nacional #9 (Argentina), 1956; M.D., Escuela de Medicina, 1961.

William W. Schlaepfer, B.A., Princeton University, 1954; M.D., Yale Medical School, 1958.

Laurence A. Sherman, B.A., B.S., University of Chicago, 1956; M.D., Albany Medical College, 1964. (See Department of Medicine)

Morton E. Smith, B.S., University of Maryland, 1956; M.D., 1960. (See Department of Ophthalmology)

Alexander C. Sonnenwirth, A.B., University of Nebraska, 1950; M.S., Purdue University, 1953; Ph.D., Washington University, 1960. (See Department of Microbiology) (Jewish Hospital)

Thomas W. Tillack, A.B., University of Rochester, 1959; M.D., Yale University, 1963.

Joseph R. Williamson, A.B., Phillips University, 1954; M.D., Washington University, 1958. (See Department of Anatomy)

Assistant Professors

Waguih M. Abdel-Bari, School of Science (Cairo), 1948; M.D., Ein Shams University (Cairo) 1953; Ph.D., Washington University, 1965.

96 The School of Medicine

Luis Alvarez, M.D., University of Santo Domingo, 1958. (Starkloff Hospital)

Frederic B. Askin, B.A., University of Virginia, 1960; M.D., 1964.

Francisco Barrios-Granguillhome, M.D., National University of Mexico, 1938.

John D. Bauer, B.Sc., University of Innsbruck, 1938; L.R.C.P. and S., University of Glasgow, 1944; M.D., Marquette University, 1947.

C. Elliott Bell, Jr. (Laboratory Medicine), B.S., Tulane University, 1960; M.D., 1964. (See Department of Medicine)

Gustave L. Davis, B.A., Union College, 1959; M.D., State University of New York, College of Medicine, 1963. (Jewish Hospital)

James E. Davis (Laboratory Medicine), B.A., Occidental College, 1965; M.S., Duke University, 1969; Ph.D., 1970. (See Department of Medicine)

Louis P. Delmer, A.B., Washington University, 1962; M.D., 1966. (See Department of Obstetrics and Gynecology)

Luis Q. Del Rosario, M.D., University of Santo Tomas (Philippines), 1954. (Starkloff Hospital)

Johann H. Joist (Laboratory Medicine), M.D., University of Cologne, 1962. (See Department of Medicine)

Valgard Jonsson (Laboratory Medicine), B.S., North Dakota State University, 1958; M.S.P.H., University of North Carolina, 1961; Ph.D., 1965.

Nadya Konikov, B.S., Boston University, 1947; M.D., 1950.

Mery Kostianovsky, M.D., Universidad Nacional del Litoral (Argentina), 1958. (St. Louis V.A. Hospitals)

Frederick T. Kraus, B.A., College of William and Mary, 1951; M.D., Washington University, 1955.

Jack H. Ladenson (Laboratory Medicine), B.S., Pennsylvania State University, 1964; Ph.D., University of Maryland, 1971. (See Department of Medicine)

Virgil Loeb, Jr., M.D., Washington University, 1944. (See Department of Medicine)

Richard G. Lynch, B.A., University of Missouri, 1961; M.D., University of Rochester, 1966.

Michael L. McDaniel, B.A., Southern Illinois University, 1963; M.S., University of North Dakota, 1966; Ph.D., St. Louis University, 1970.

David N. Menton, B.S., Mankato State College, 1959; Ph.D., Brown University, 1966. (See Department of Anatomy)

John S. Meyer, A.B., Yale University, 1952; M.D., Washington University, 1956. (Jewish Hospital)

Blanca M. Perez, B.A., Universidad del Valle (Colombia), 1953; M.D., 1961. (Jewish Hospital)

William R. Platt, B.S., University of Maryland, 1936; M.D., 1940.

Peter A. Pullon, B.A., Albion College, 1960; D.D.S., University of Michigan, 1965; M.S., 1968. (Also School of Dentistry)

Carl H. Smith, B.A., Swarthmore College, 1955; M.D., Yale University, 1959. (See Department of Pediatrics)

Sue Cassell Stevens, A.B., Goucher College, 1930; M.A., 1931; Ph.D., Columbia University, 1940. (Jewish Hospital)

Steven L. Teitelbaum, B.A., Columbia University, 1960; M.D., Washington University, 1964. (Jewish Hospital)

Instructors

Emilio B. Apostol, M.D., University of Santo Tomas (Philippines), 1962. (Starkloff Hospital)

Madhu Bahl, F.Sc., K. M. V. College, 1958; M.D., Christian Medical College, 1963. (Starkloff Hospital)

James L. Claflin, B.A., Whitman College, 1964; M.S., University of Montana, 1966; Ph.D., 1970.

Emily H. Coch, B.S., City College of the City of New York, 1962; Ph.D., Duke University, 1970. (Jewish Hospital)

Marcos G. Cruz, A.B., Manila Central University, 1952; M.D., 1957. (St. Louis V.A. Hospitals)

Robert R. Dahlgren, B.S., Oklahoma State University, 1962; D.V.M., 1963; M.S., 1966.

Federico Florendo, Jr., A.A., Silliman University, 1935; M.D., University of Philippines, 1941; M.P.H., Harvard School of Public Health, 1948. (St. Louis V.A. Hospitals)

Eugene Hoff, B.A., Washington University, 1960; M.S., Yale University, 1961; M.D., Columbia University, 1963.

Kavous Khodadoust, M.D., Tehran University School of Medicine, 1965. (Starkloff Hospital)

Rodolfo A. Lattore, M.D., University of the East-Ramon Magsayay Memorial Medical Center, 1961.

John W. Lewis, III (Laboratory Medicine), B.S., Georgia Institute of Technology, 1966; Ph.D., 1971. (See Biomedical Computer Laboratory)

Kathleen S. McLaughlin, B.S., St. Louis University, 1960; M.D., Washington University, 1964.

Manuel F. Menendez, B.S., University of Havana, 1949; M.D., 1956.

Eugenia H. Parker, B.A., University of Miami, 1953; M.D., Harvard Medical School, 1962. (St. Louis V.A. Hospitals)

Richard Payne, B.S., Ohio University, 1960; M.D., Washington University, 1963.

Carlos Perez-Mesa, M.D., University of Havana, 1950.

Ursula Scalford, B.S., Howard University, 1942; M.D., 1945.

Baldev Sehgal, M.D., B.S., University of the Panjab, 1945; M.D., Andhra Medical College, 1961. (St. Louis V.A. Hospitals)

Luis Tumialan, M.D., University of San Marcos (Peru), 1964.

Mario Velez, M.D., Universidad de Caldas, 1959. (Starkloff Hospital)

Research Assistants

Edward H. Finke, B.S., Washington University, 1962.

James Gottfried, B.S., University of Dayton, 1964. (Starkloff Hospital)

William J. Kraft, B.A., Southern Illinois University, 1969. (Jewish Hospital)

Maria C. LaValle, A.B., Hunter College, 1963.

Mary L. Stenstrom, B.S., Purdue University, 1967.

Dorothy J. Vervynck, B.S., Marymount College, 1966.

The Edward Mallinckrodt Department of Pediatrics



The primary aim of the Department of Pediatrics in the teaching program is to stimulate interest in developmental biology, especially human growth and development, and to provide the student with a foundation sufficiently comprehensive so that he will have an appreciation of pediatric problems regardless of his future choice of a career in medicine.

The major clinical and research facilities are in the St. Louis Children's Hospital and the St. Louis Maternity Hospital. The former has a bed capacity of 165, and accepts children under sixteen years of age with all types of medical problems. Hospital admittances average 6,000 annually. The Pediatric Out-patient Division averages about 40,000 yearly visits. In the Medical Center the

yearly number of newborn infants averages more than 4,000.

SECOND YEAR

The student is introduced to pediatrics and to the full-time staff through a series of lectures designed to acquaint him with the concepts of human growth and development, genetics, and the effects of age and maturity on reactions to injury and disease. A second series of talks highlights the important disorders commonly encountered in infants and children. The unique aspects of the physical examination of the infant and child are presented during the course in physical diagnosis. Members of the Department also participate in the sophomore course in pathophysiology.

THIRD YEAR

A clerkship of six weeks is scheduled, during which period the student participates in the following:

1. Care of inpatients, sharing responsibility with intern or resident.
2. Daily ward rounds and bedside conferences with house staff and attending physician.
3. Afternoon conferences on various facets of pediatrics.
4. Tutorial with junior faculty.
5. Weekly grand rounds.

FOURTH YEAR

This year is devoted to elective time which may be spent according to the individual preferences of the student. He may serve as an intern substitute or in the research laboratory or combine clinical and laboratory work. The following electives are offered:

Pediatric Cardiology

Clinical Inpatient Service. Diagnosis and management of patients with acquired and congenital heart disease, including critically ill and postoperative patients in the Intensive Care Unit. Activities include daily ward rounds, precatheterization critiques three times a week, and a weekly conference on catheterization laboratory findings.

Outpatient Service. New patients for consultation, as well as follow-up of old patients.
(Dr. Goldring)

Laboratory Diagnostic Procedures. The student is involved as an observer and then as a participant in conducting catheterization and angiocardigraphic studies. The theory and interpretation of physiologic data is re-

viewed in daily sessions. The student may participate in the other activities of the Pediatric Cardiology Division as time permits.

(Dr. Hartmann)

Research Elective. This study is concerned with the effect of digoxin (tritium labeled) on the cardiovascular hemodynamics of the fetal lamb. There will be opportunity to learn about cardiac output, blood flow and the use of isotopes (tritium labeled digoxin) in experimental procedures.

(Drs. Goldring, Hernandez)

Electrocardiography, Vectorcardiography, Phonocardiography. An intensive course, with emphasis on the electrophysiology and theory as well as interpretation of electrocardiograms, phonocardiograms and vectorcardiograms of inpatients and outpatients. The student may participate in the other activities of the Pediatric Cardiology Division as time permits.
(Dr. Hernandez)

Pediatric Neurology

Clinical Elective No. 1. The student participates as a full member of the neurology ward team and is directly responsible for a proportion of the patients on the service under the direction of the senior resident. He is expected to take night call every third night, during which time he is responsible for the medical care of the entire ward, as well as for emergency admissions.

(Drs. Dodge, Prenskey)

Clinical Elective No. 2. Clinical child development, with major emphasis on developmental learning disorders and behavior problems. Time will be spent in various hospital, community, and school-based clinics. Clinical research opportunities available.
(Dr. Weinberg)

Research Elective. The student has an opportunity to learn some of the chromatographic and spectrophotometric techniques frequently used in developmental neurochemistry, while working on a project of his own choosing or one that is currently in progress in the laboratory. Prior discussion is necessary.

(Drs. Agrawal, DeVivo, Fishman, Prensky)

Research Elective. The effects of acute and chronic administration of hexachlorophene on cerebral metabolism of newborn and young mice. The effects of the drug on blood and liver and kidney metabolism. Objectives are to determine biochemical correlates of clinical neurotoxicity and the spongy degeneration found in the white matter of brain.

(Dr. Holowach)

Pediatric Infectious Diseases

Clinical Elective. The student is assigned selected patients on the Isolation Division for initial evaluation and continuing care. He attends daily ward rounds and scheduled conferences. Time is spent each day reading cultures in the diagnostic bacteriology laboratory. Instruction is given in diagnostic serology.

(Dr. Middelkamp)

Research Elective. Laboratory research programs are available in the areas of (1) tissue culture; (2) fetal and neonatal viral infections; (3) electron microscopy of viral infections; (4) metabolic aspects of infectious diseases in man and a variety of animal models. Amino acids in blood and urine are studied in terms of their differential diagnostic and prognostic possibilities during active infection, and mechanisms for these changes are sought.

(Drs. Feigin, Middelkamp)

Pediatric Hematology and Oncology. Large numbers of children with diverse hematological and oncological problems are seen. During the six-week rotation the student is expected to acquire sufficient knowledge to interpret the blood smears, bone marrows, and special laboratory studies. Concepts of management and differential diagnosis are reviewed.

(Drs. Land, Ragab, Vietti, Zarkowsky)

Pediatric Clinical Allergy. Complete review of allergic theory. Application of approach to patient evaluation and therapeutics. Responsibility for inpatients and outpatients, patient care, and evaluation of methods of diagnosis and therapy. Multidiscipline approach to care of allergic patients. Student is expected to complete a short library or laboratory project in ongoing research in allergy.

(Dr. D. Thurston)

Pediatric Renal Disease. The students evaluate and present both inpatients and outpatients who have renal disease. Discussions emphasize the relationship between the clinical problem and the pathophysiology underlying the disease. Clinical features are related to pathologic and immunopathologic changes. Surgical aspects of pediatric nephrology are discussed, and there are formal sessions in which renal physiology and clinical topics are reviewed by the students. Other pediatric teaching functions may be attended.

(Drs. Cole, Robson)

Pediatric Ambulatory Service. A six-week course with participation in all aspects of ambulatory care of children under the direction of St. Louis Children's Hospital staff physicians. Includes diagnosis and treatment of acute and chronic illness in general pediatric service, in private physicians' of-

fices, and in the emergency room. Experiences in subspecialties and in community clinics are also offered. (Dr. Jones)

General Clinical Pediatrics. The student will participate as an active member of the pediatric care team at the St. Louis County Hospital. Under supervision of faculty and senior resident, he will see patients in the pediatric clinics, the emergency room, the neonatal nursery, and the inpatient service. The elective is designed to provide a general pediatric experience, with emphasis on ambulatory care and neonatology. (Drs. Barton, Kahn)

Combined Pediatric and Adult Metabolism. This elective is designed to include broad clinical experience in both pediatric and adult endocrine problems. The student has an opportunity to work up all of the pediatric endocrine patients and to see most of the adult patients. He attends rounds in pediatric metabolism, pediatric-endocrine and diabetic clinics, and the adult metabolic research seminar and rounds. There is an opportunity to attend pediatric and medical grand rounds and metabolic rounds at Jewish Hospital. A large number of patients with all types of endocrine disorders are seen and studied in depth.

(Drs. Daughaday, Pagliara, Weldon)

Genetics

Medical Genetics. Twelve weeks, all day. Combined clinical and research course.

(Drs. Hillman, Kaufman, Sly)

Clinical Genetics. Six weeks, all day. Experience in clinical/laboratory approach to study of genetic problems. Students see all consultations referred to the Division of Medical Genetics. They work in Medical

Genetics Clinic on Tuesday mornings, attend daily genetics rounds, and participate in scheduled seminars. (Dr. Kaufman)

Neonatology. The time is spent at St. Louis Children's Hospital in the intensive care nursery learning the care of severely ill newborns and prematures. During the entire six weeks, daily teaching rounds will be held on the intensive care unit at Maternity Hos-

pital. Interested students may arrange to spend time at Maternity Hospital learning the examination and care of normal newborn and premature infants, as well as those with less severe illnesses that do not require intensive care. Night call every third night working with house officers will be expected. Students will be offered considerable responsibility in patient care and may participate in the transportation of ill patients from other hospitals to St. Louis Children's Hospital. Opportunities are available for clinical research in perinatal medicine.

(Dr. Marshall)

Seminar Elective

Developmental Neurobiology. This course covers selected topics in the development of the nervous system. While emphasis is given to the neurochemical aspects of brain growth and maturation, there are also discussions of the neurophysiological and functional development of the brain. The relationship between chemical, physiological, and functional development and underlying anatomical changes is stressed. The course is conducted as a seminar, with papers assigned prior to each meeting. Members of the Departments of Pediatrics and Neurology are present at these discussions to clarify obscure points and to add additional information when possible. (Dr. Agrawal)

Professor and Head of the Department

Philip R. Dodge, M.D., University of Rochester, 1948. (See Department of Neurology)

Professors

David Goldring, A.B., Washington University, 1936; M.D., 1940.

John C. Herweg, B.S., Drury College, 1943; M.D., Washington University, 1945. (See Administration)

John M. Kissane, A.B., University of Rochester, 1948; M.D., Washington University, 1952. (See Department of Pathology)

William H. McAlister, B.S., Wayne State University, 1950; M.D., 1954. (See Department of Radiology)

J. Neal Middelkamp, B.S., University of Missouri, 1946; M.D., Washington University, 1948.

James E. Miller, B.S., Tulane University, 1946; M.D., Medical College of Alabama, 1949. (See Department of Ophthalmology)

Theresa J. Vietti, A.B., Rice University, 1949; M.D., Baylor University, 1953. (See Department of Radiology)

Professor Emeritus (Clinical)

Park J. White, A.B., Harvard University, 1913; M.D., Columbia University, 1917.

Professor (Clinical)

Joseph C. Jaudon, A.B., Washington University, 1926; M.D., 1933.

Associate Professors

Ralph D. Feigin, A.B., Columbia College, 1958; M.D., Boston University, 1962.

Alexis F. Hartmann, Jr., B.S., Washington University, 1947; M.D., 1951.

Dorothy J. Jones, A.B., Oberlin College, 1930; M.D., Washington University, 1934.

Lawrence I. Kahn, A.B., University of Alabama, 1941; M.D., Louisiana State University, 1945. (See Division of Health Care Research)

Richard E. Marshall, B.A., Wesleyan University, 1954; M.D., Yale University, 1962.

James S. Nelson, M.D., St. Louis University, 1957. (See Department of Pathology)

Arthur L. Prensky, A.B., Cornell University, 1951; M.D., New York University, 1955. (See Department of Neurology)

Alan M. Robson, M.B.B.S., University of Durham (England), 1959; M.D., 1964. (See Department of Medicine)

William S. Sly, M.D., St. Louis University, 1957. (See Department of Medicine)

Jessie L. Ternberg, A.B., Grinnell College, 1946; Ph.D., University of Texas, 1950; M.D., Washington University, 1953. (See Department of Surgery)

Donald L. Thurston, B.S., Vanderbilt University, 1934; M.D., 1937.

Jean H. Thurston, B.A., University of Alberta, 1937; M.D., 1941.

Virginia V. Weldon, A.B., Smith College, 1957; M.D., University of Buffalo, 1962.

Assistant Professor Emeritus

Ruth E. Martin (Dentistry), D.D.S., Washington University, 1923.

Assistant Professors

Leslie L. Barton, B.A., Hunter College, 1962; M.D., University of Chicago, 1966.

Barbara R. Cole, B.A., Doane College, 1963; M.D., University of Kansas, 1967.

Darryl C. DeVivo, B.A., Amherst College, 1959; M.D., University of Virginia, 1964. (See Department of Neurology)

David N. Dietzler, A.B., Washington University, 1957; Ph.D., 1963. (See Department of Pharmacology)



Marvin A. Fishman, B.S., University of Illinois, 1959; M.D., 1961. (See Department of Neurology)

Morey W. Haymond, B.A., Grinnell College, 1965; M.D., Washington University, 1969.

Barbara M. Herjanic, B.A., Northwestern University, 1943; B.S., Western Michigan College, 1946; M.D., University of Michigan, 1950. (See Department of Psychiatry)

Antonio Hernandez, Jr., A.A., University of the Philippines, 1949; M.D., Manila Central University, 1954.

Richard E. Hillman, A.B., Brown University, 1962; M.D., Yale University, 1965.

Robert L. Kaufman, A.B., Washington University, 1959; M.D., 1963. (See Department of Medicine)

James P. Keating, A.B., Harvard University, 1959; M.D., 1963.

Vita J. Land, B.S., McGill University, 1961; M.D., 1965.

Charles B. Manley, Jr. (Genitourinary Surgery), A.B., University of Missouri, 1955; M.D., 1958. (See Department of Surgery) (Jewish Hospital)

Anthony S. Pagliara B. S., Union College, 1960; M.D., Albany Medical College, 1965. (Howard Hughes Medical Institute Investigator) (See Department of Medicine)

Helen Palkes (Psychology), B.S., Washington University, 1966; M.A., 1968.

Mabel L. Purkerson, A.B., Erskine College, 1951; M.D., Medical College of South Carolina, 1956. (See Department of Medicine)

Abdel S. Ragab, M.B.B.Ch., Cairo University, 1961; D.Ch., 1964; D.M., 1965; M.D., 1967.

Carl H. Smith, B.A., Swarthmore College, 1955; M.D., Yale University, 1959. (See Department of Pathology)

James K. Turner, A.B., Washington University, 1949; M.D., 1953. (See Division of Health Care Research)

Joseph J. Volpe, B.A., Bowdoin College, 1960; M.D., Harvard University, 1964. (See Department of Neurology)

Warren A. Weinberg, B.A., Vanderbilt University, 1956; M.D., 1959. (See Department of Neurology)

Harold Zarkowsky, A.B., Washington University, 1957; M.D., 1961.

Research Assistant Professors

Harish C. Agrawal, B.Sc., Allahabad University (India), 1957; M.S., 1959; Ph.D., 1964.

Mary L. Parker, B.S., Florida State University, 1946; M.S., 1949; M.D., Washington University, 1953. (On leave of absence) (See Departments of Medicine and of Preventive Medicine and Public Health)

Assistant Professors Emeriti (Clinical)

Max Deutch, M.D., Washington University, 1926. (Also Lecturer)

Sol Londe, B.S., Washington University, 1925; M.D., 1927.

Maurice J. Lonsway, B.S., Valparaiso University, 1910; M.D., St. Louis University, 1914.

Assistant Professors (Clinical)

Helen M. Aff, B.S., Washington University, 1934; M.D., 1934.

C. Read Boles, A.B., Washington University, 1940; M.D., 1943.

Martin Calodney, B.S., College of the City of New York, 1930; M.D., New York University, 1936.

Ira J. Friedman, B.S., University of Arkansas, 1955; M.D., 1960.

Robert H. Friedman, M.D., Washington University, 1948.

Samuel W. Gollub, B.S., Washington University, 1941; M.D., 1941.

Gene H. Grabau, B.S., St. Louis College of Pharmacy, 1937; M.D., Washington University, 1942.

Marshall B. Greenman, B.S., University of Illinois, 1946; M.D., 1948.

Norman Hankin, A.B., University of Wisconsin, 1940; M.D., 1943.

Stanley L. Harrison, B.S., Washington University, 1928; M.D., 1930. (On leave of absence)

Frederick A. Jacobs, B.S., Washington University, 1927; M.D., 1928.

Maurice J. Keller, A.B., Yale University, 1936; M.D., Columbia University, 1940.

Kenneth A. Koerner, A.B., Washington University, 1935; M.D., 1941.

Marianne Kuttner, M.D., Johann Wolfgang Goethe University (Frankfurt am Main), 1931.

Maurice J. Lonsway, Jr., A.B., Washington University, 1946; M.D., 1950.

Richard Margolis, B.S., College of William and Mary, 1947; M.D., Western Reserve University, 1951.

John C. Martz, A.B., University of Missouri, 1938; M.D., Washington University, 1942.

David N. McClure, M.D., University of Tennessee, 1940.

Helen E. Nash, A.B., Spelman College, 1942; M.D., Meharry Medical College, 1945.

Paul H. Painter, M.D., St. Louis University, 1947. (See Department of Child Psychiatry)

Frederick D. Peterson, A.B., Knox College, 1953; M.D., Washington University, 1957.

Edith C. Robinson, A.B., Randolph-Macon College, 1927; M.S., University of South Carolina, 1928; M.D., Johns Hopkins University, 1932. (See Department of Child Psychiatry)

Frederick K. Sargent, A.B., Yale University, 1939; M.D., Cornell University, 1943.

George Sato, M.D., Washington University, 1947.

Alfred S. Schwartz, A.B., Amherst College, 1932; M.D., Johns Hopkins University, 1936.

Bernard Schwartzman, A.B., Washington University, 1931; M.D., 1935.

Donald B. Strominger, B.A., Yale University, 1949; M.D., Washington University, 1953.

Frank S. Wissmath, A.B., Washington University, 1939; M.D., 1943.

Instructors

John Gilster (Dentistry), D.D.S., Washington University, 1944.

Laura S. Hillman, B.A., Carleton College, 1964; M.D., Yale University, 1968.

Patricia A. Parsons (Dentistry), B.S., San Diego State College, 1953; D.D.S., Washington University, 1957.

Paul S. Simons, B.A., University of Texas, 1963; M.D., Washington University, 1967. (See Division of Health Care Research)

Research Instructor

Elaine Miller, A.B., Judson College, 1944; M.D., Medical College of Alabama, 1949. (See Department of Ophthalmology)

Instructors (Clinical)

Christos A. Antoniou, M.D., University of Athens, 1958.

Edward T. Barker, A.B., Princeton University, 1953; M.D., Washington University, 1957.

Gordon R. Bloomberg, A.B., University of Illinois, 1955; B.S., 1955; M.D., 1959.

Elliot F. Gellman, B.A., State University of Iowa, 1957; M.D., University of Missouri, 1961.

Roman E. Hammes, B.A., University of Iowa, 1950; M.D., 1954.

J. Larry Harwell, A.B., Washington University, 1957; M.D., University of Missouri, 1961.

Sheldon Kessler, M.D., St. Louis University, 1951.

Henry L. Knock, A.B., Johns Hopkins University, 1949; M.D., 1952.

Norton S. Kronemer, A.B., Washington University, 1958; M.D., University of Missouri, 1962.

Robert D. Lins, A.B., University of Missouri, 1965; M.D., 1969.

Stanley B. Lyss, A.B., Harvard University, 1958; M.D., Washington University, 1962.

Homer E. Nash, Jr., M.D., Meharry Medical College, 1951.

Eugenia M. Pierce, M.D., St. Louis University, 1958.

Susan Pittman, A.B., University of Missouri, 1959; M.D., 1963.

Steven I. Plax, A.B., University of Missouri, 1957; M.D., 1961.

Robert C. Schaan, A.B., Washington University, 1949; M.D., 1953.

Warren G. Sherman, B.A., University of Missouri, 1965; M.D., Tulane University, 1969.

Richard H. Spitz, B.A., Washington University, 1946; M.D., 1952.

Mary A. T. Tillman, M.D., Howard University, 1960.

Argyrios A. Tsifutis, M.D., Salonika University Medical School, 1954.

Orestes S. Valdes, B.S., Instituto de Santa Clara (Cuba), 1947; M.D., University of Havana, 1954.

Barbara N. Voegelé, B.S., University of Illinois, 1950; M.D., Washington University, 1957.

Roger J. Waxelman, A.B., Washington University, 1965; M.D., University of Missouri, 1969.

George T. Wilkins, Jr., B.S., University of Illinois, 1956; M.D., 1957.

Kathleen Winters, B.S., Winthrop College, 1946; M.D., Medical College of South Carolina, 1955.

Gerald Wool, A.B., Princeton University, 1958; M.D., Washington University, 1962.

H. Benjamin Zwirn, M.D., University of Basel (Switzerland), 1954.

Instructors Emeriti (Clinical)

Joseph A. Bauer, M.D., Washington University, 1926.

Edwin H. Rohlfing, M.D., Washington University, 1919.

Assistant

Susan K. Keating (Health Services), B.S., University of North Carolina School of Nursing, 1965. (See Division of Health Care Research)

Research Assistants

Charles E. Crawford, Jr., B.S., Washington University, 1956.

Susan Dietz, A.A., Briarcliff College, 1964; B.A., Wheaton College, 1966; M.S.C.&P., Washington University, 1968; M.A., 1970.

Duane M. Martin, B.A., Cardinal Glennon College, 1964.

Charles A. Reed, A.B., Washington University, 1961.

Assistants (Clinical)

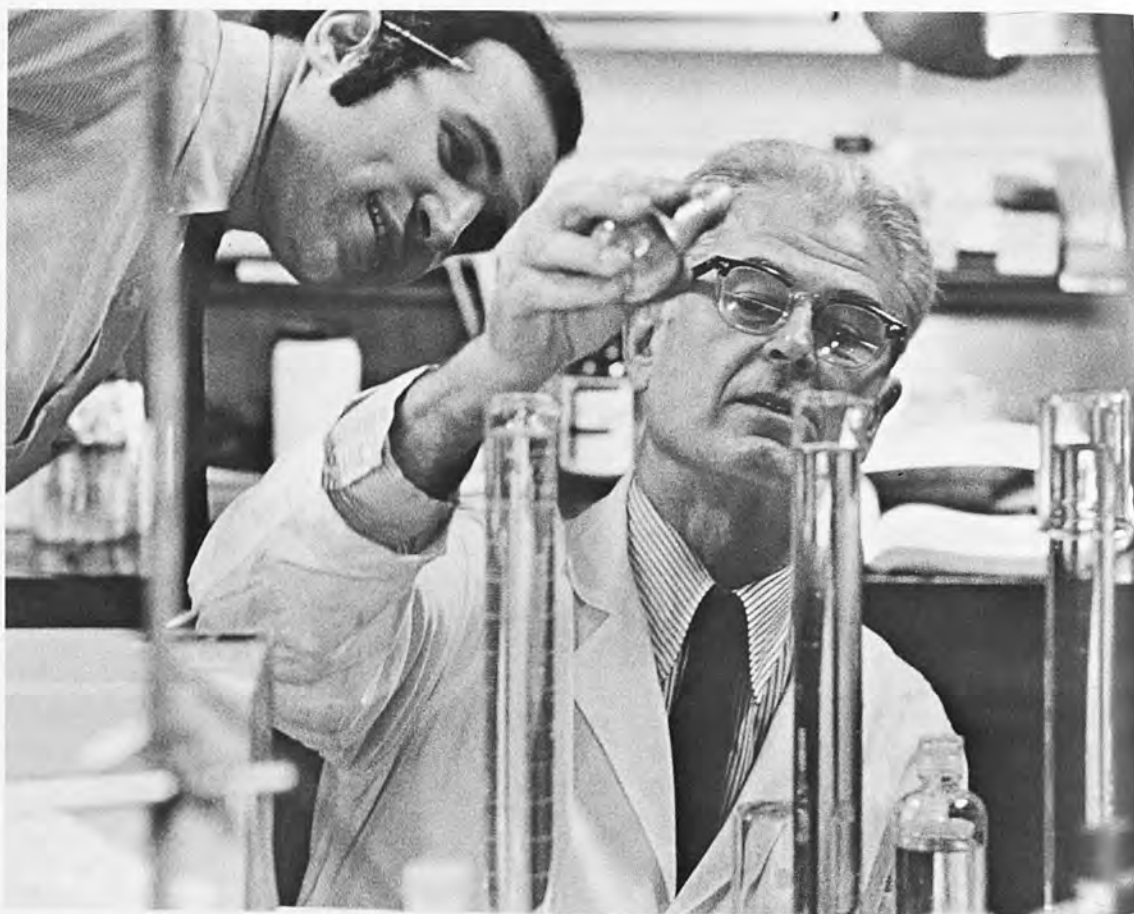
Jean M. Auguste, B.A., Lycée T. L'Ouverture (Haiti), 1950; M.D., Medical School of Haiti, 1956.

Robert D. Cox, B.S., University of Notre Dame, 1945; M.D., Johns Hopkins University, 1949.

Gerald J. Duling, B.S., Xavier University, 1955; M.D., St. Louis University, 1959.

Seymour M. Schlansky, M.D., Chicago Medical School, 1950.

The Edward Mallinckrodt Department of Pharmacology



The number of useful drugs is steadily increasing. It is the purpose of the pharmacology course, through discussions of existing drugs, to develop general principles which will be applicable as well to drugs of the future. Pharmacology draws heavily on biochemistry, physiology, and microbiology for an understanding of drug action. It looks toward pathology, medicine, and surgery for its uses. For this reason, the course is constructed as a part of the continuum of

medicine rather than a separate discipline. Since many drugs are harmful in excessive amounts, toxicology is included as a logical part of pharmacology.

The laboratory portion of the course is closely coordinated with the lecture material and is designed to demonstrate and emphasize pertinent pharmacological principles and to employ agents, equipment, and skills relevant to current medical practice.

SECOND YEAR

501, 502. (a) Lectures, conferences, panel discussions. (b) Laboratory course. Credit 7 units for the year. (Dr. Lowry and Staff)

Electives

521. *The Interaction of Drugs with Tissue Components.*

Kinetics of Pharmacologic Reactions. Mathematical consideration of the binding of drug(s) to bioreceptor(s) and the relationship to enzyme-substrate kinetics.

525, 526. *Current Topics in Pharmacology.* Topics of current interest will be presented and discussed. Critical evaluation will be made of recent articles in the scientific literature. Required of all graduate students in the Department. Credit 2 units for the year.

572. *Biochemistry and Pharmacology of the Nervous System.* Topics covered include carbohydrates; energy metabolism related to different functional states; amino acid metabolism in relation to protein and transmitter synthesis; cerebral lipids, membranes, lipid metabolism; transmitters and modulators; cerebral blood flow, blood brain barrier. Credit 2 units.

(Drs. McDougal, B. Moore, and Staff)

Research Electives

590. *Research.* The facilities of the laboratory are available to those who wish to carry on an original investigation on problems of their own or on those the Department is prepared to suggest.

Problems in basic and clinical pharmacology in the urinary tract. (Dr. Boyarsky)

Problems in the biochemical development of rat tissues. (Dr. Burch)

Regional CNS chemistry; cyclic nucleotide metabolism. (Dr. Ferrendelli)

Lipids of the nervous system; chemistry of the synapse; psychoactive drugs.

(Dr. Burton)

Photophosphorylation and electron transfer in biological systems. Albumin synthesis.

(Dr. Geller)

Studies on oxidative phosphorylation and mitochondrial structure, as well as purification and properties of the drug metabolizing enzyme.

(Dr. Hunter)

Immune damage to cell membranes.

(Dr. Kinsky)

Metabolism of isolated pancreatic islets. Insulin release and prostaglandins.

(Dr. Matschinsky)

Comparative neurochemistry, energy metabolism in nerve, biochemical effects of thiamine deficiency and axonal flow.

(Dr. McDougal)

The effect of anesthetic drugs on energy dependent and energy independent ion movements in isolated mitochondria and synaptosomes.

(Dr. Miller)

Pharmacology of renal hypertension, shock, and prostaglandins.

(Dr. Needleman)

Note—The number preceding the course title indicates that the course carries credit in the Graduate School of Arts and Sciences.

Professor and Head of the Department

Oliver H. Lowry, B.S., Northwestern University, 1932; Ph.D., University of Chicago, 1937; M.D., 1937.

Professors

F. Edmund Hunter, Jr., B.S., Mount Union College, 1938; Ph.D., University of Rochester, 1941.

Stephen C. Kinsky, A.B., University of Chicago, 1951; Ph.D., Johns Hopkins University, 1957. (See Department of Microbiology)

Franz M. Matschinsky, M.B., University of Freiburg, 1955; M.D., University of Munich, 1959.

David B. McDougal, Jr., A.B., Princeton University, 1945; M.D., University of Chicago, 1947.

Associate Professors

Saul Boyarsky, B.S., University of Vermont, 1943; M.D., 1946. (See Department of Surgery)

Helen B. Burch, B.S., Texas University, 1926; M.S., Iowa State University, 1928; Ph.D., 1935.

Robert M. Burton, B.S., University of Maryland, 1950; M.S., Georgetown University, 1952; Ph.D., Johns Hopkins University, 1955.

David M. Geller, B.A., Amherst College, 1952; Ph.D., Harvard University, 1957.

Philip Needleman, B.S., Philadelphia College of Pharmacy and Science, 1960; M.S., 1962; Ph.D., University of Maryland Medical School, 1964.

Assistant Professors

Irving Boime, B.S., St. Louis College of Pharmacy, 1964; M.S., Purdue University, 1966; Ph.D., Washington University, 1970. (See Department of Obstetrics and Gynecology)

James A. Ferrendelli, A.B., University of Colorado, 1958; M.D., 1962. (See Department of Neurology)

Robert N. Miller, A.B., University of Missouri, 1957; M.D., 1961. (See Department of Anesthesiology)

Research Assistant Professor

Sosamma J. Berger, B.S., University of Bombay, 1958; M.S., University of Puget Sound, 1962; Ph.D., Hahnemann Medical College, 1968.

Research Instructor

Ellen E. Smith, B.S., University of Pittsburgh, 1939; M.S., 1942; Ph.D., 1948.

Lecturer

David N. Dietzler, A.B., Washington University, 1957; Ph.D., 1963. (See Department of Pediatrics)



Department of Physiology and Biophysics

The Department offers instruction to medical and graduate students. A course in the second semester of the first year of the medical curriculum is designed to provide students with a foundation for their further study of clinical and applied physiology. In addition, advanced courses open to medical and graduate students provide for more detailed study of specific areas of physiology and biophysics.

The following research interests are represented in the Department at the present time: macromolecular structure as studied by X-ray crystallography and other physical methods, the mechanism of action of polypeptide hormones, transport across cell membranes, neurophysiology, contractile activation of muscle, cardiac muscle, peripheral circulation, respiration, and the application of computer techniques to biological problems. The interests in neurophysiology concern principally membrane phenomena in nerve fibers, the function of receptors and sensory systems. Electron microscopy of nerve and muscle is used to relate structure and function in these tissues.

FIRST YEAR

502. *Introduction to Physiology.* Lectures, demonstrations, and laboratory experiments are utilized to provide a basis for understanding general physiological mechanisms and the functional organization of physiological systems that are of immediate or potential importance in medicine. Credit 8 units. (Staff)

504. *Neural Sciences.* A conjoint course on the structure and function of the nervous system given by the departments of Anatomy and Physiology and Biophysics. Credit 5 units.



Electives

507. *Protein Crystallography.* Topics to be covered include the structure of proteins and nucleic acids and a discussion of the theory and instrumentation related to their determination. Credit 2 units. Offered in alternate years. (Drs. Banaszak, Mathews)

509. *Biochemistry and Physiology of Peptide Hormones.* Structural basis for physiological action of biologically active polypeptides. Credit 2 units. (Dr. Marshall)

511. *Properties of Cell Membranes.* A consideration of active and passive membrane transport. Credit 3 units. (Drs. Blaustein, DeWeer)

513. *Nerve, Muscle and Synapse.* Mechanisms of conduction and synaptic transmission, excitation, and contraction of muscle. Credit 2 units. Offered in alternate years. (Drs. Blaustein, Rovainen)

515. Sensory Systems. A detailed study of somatic, auditory, and visual physiology. Credit 2 units. Offered in alternate years.

(Drs. Burton, Daw, Hunt, Molnar, Pearlman, Pfeiffer)

517. Striated Muscle. A detailed study of the mechanisms of excitability and contractility in skeletal and cardiac muscle cells. Credit 2 units.

(Dr. Costantin)

519. Fundamentals of Circulation. Mechanisms of cardiac muscle excitation and contraction. Analysis of peripheral circulation. Neural regulation of circulation. Credit 2 units.

(Dr. Lang)

521. Long-term Changes in the Nervous System. Development of the nervous system, trans-neuronal degeneration, synaptic facilitation, trophic effects in nerve and muscle, specificity of reinnervation, sensory deprivation, visual-motor development. Credit 2 units. Offered in alternate years.

(Drs. Cowan, Pearlman, Rovainen)

590. Research. The Department offers a variety of research opportunities, particularly in the following areas: macromolecular structure as studied by X-ray crystallography; synthesis and biological activities of polypeptides; membrane transport; neurophysiology including nerve membrane, muscle, synaptic transmission, sensory systems (especially auditory and visual), electron microscopy of neural tissues, and biochemical regulation in neurons; circulation (especially peripheral) and heart muscle; respiration; renal physiology; and the application of computer sciences to physiological problems.

(Staff)

Note—The number preceding the course title indicates that the course carries credit in the Graduate School of Arts and Sciences.

Edward Mallinckrodt, Jr., Professor and Head of the Department

Carlton C. Hunt, B.A., Columbia University, 1939; M.D., Cornell University, 1942.

Professors Emeriti

Hallowell Davis, A.B., Harvard University, 1918; M.D., 1922; Sc.D. (hon.), Colby College, 1954. (See Department of Otolaryngology) (Also Lecturer) (Also Central Institute for the Deaf)

Arthur S. Gilson, Jr., B.S., Dartmouth College, 1919; A.M., Harvard University, 1922; Ph.D., 1924.

Harvey Lester White, B.S., Washington University, 1918; M.D., 1920.

Professors

Jerome R. Cox, Jr. (Biomedical Engineering), S.B., Massachusetts Institute of Technology, 1947; S.M., 1949; Sc.D., 1954. (See Biomedical Computer Laboratory and Division of Health Care Research) (Also School of Engineering and Applied Science)

Charles E. Molnar, B.S.E.E., Rutgers University, 1956; M.S.E.E., 1957; Sc.D., Massachusetts Institute of Technology, 1966. (Also Computer Systems Laboratory)

Albert Roos, M.D., University of Groningen, 1940. (See Department of Anesthesiology)

John R. Smith, A.B., University of Wisconsin, 1931; A.M., 1932; M.D., Washington University, 1934. (See Department of Medicine)

Associate Professors

Leonard J. Banaszak, B.S., University of Wisconsin, 1955; M.S., Loyola University, 1960; Ph.D., 1961. (See Department of Biological Chemistry)

Mordecai P. Blaustein, B.A., Cornell University, 1957; M.D., Washington University, 1962.

LeRoy L. Costantin, A.B., Columbia College, 1955; M.D., College of Physicians and Surgeons, Columbia College, 1959.

Nigel W. Daw, B.A., Trinity College, Cambridge, 1956; M.A., 1961; Johns Hopkins University, 1967. (See Department of Ophthalmology)

Paul J. De Weer, B.S., University of Louvain, 1959; M.D., 1963; M.S., 1964; Ph.D., University of Maryland, 1969.

Stanley Lang, Ph.B., University of Chicago, 1948; B.S., 1949; M.S., 1951; Ph.D., 1953.

Garland R. Marshall (Established Investigator of the American Heart Association), B.S., California Institute of Technology, 1962; Ph.D., Rockefeller University, 1966. (See Department of Biological Chemistry)

F. Scott Mathews, B.S., University of California, 1955; Ph.D., University of Minnesota, 1959. (See Department of Biological Chemistry)

Alan L. Pearlman, A.B., State University of Iowa, 1958; M.D., Washington University, 1961. (See Department of Neurology)

Russell R. Pfeiffer, B.S., Purdue University, 1959; S.M., Massachusetts Institute of Technology, 1960; Ph.D., 1963. (Also School of Engineering and Applied Science)

Carl M. Rovainen, B.S., California Institute of Technology, 1962; Ph.D., Harvard University, 1967.

Duane C. Hellam, B.A., Arizona State College, 1955; M.D., Washington University, 1959. (See Department of Medicine)

Dale Purves, A.B., Yale University, 1960; M.D., Harvard Medical School, 1964.

Philip D. Stahl, B.S., West Liberty State College, 1964; Ph.D., West Virginia University, 1967.

Lewis J. Thomas, Jr., B.S., Haverford College, 1953; M.D., Washington University, 1957. (See Department of Anesthesiology and Biomedical Computer Laboratory)

Assistant Professors

C. David Berry, B.Sc., Manchester University, 1962; Ph.D., 1965. (Also Computer Systems Laboratory)

W. Sherman Beacham, B.S., University of Utah, 1961; M.D., 1964.

Harold Burton, B.A., University of Michigan, 1964; Ph.D., University of Wisconsin, 1968. (See Department of Anatomy)

Department of Preventive Medicine and Public Health



The Department offers instruction during the first and second years of the curriculum and provides other learning experience in elective courses in the fourth year. In clinical clerkships of other departments, students also have experience in rehabilitation in the Irene Walter Johnson Institute of Rehabilitation. In the first semester of the first year, the course *Social Aspects of Medicine* provides background information, and students are encouraged to participate in discussion of important and evolving issues of medical care. A course in statistical methods in medicine, given in the second semester, affords a basis of understanding of quantitative assessment in biology and medicine and prepares the student for critical evaluation of reports in the medical literature. During the second year in the course in pathophysiology, the Department contributes material concerning the epidemi-

ology of disease and the variety of factors in the person and environment which contribute to the occurrence of disease, and provides approaches and methods for prevention and control. Interested students may choose to participate in more intensive study of certain of these subject areas in elective offerings of the Department.

FIRST YEAR

The Social Aspects of Medicine. The course consists of seventeen required two-hour sessions during which various topics dealing with current issues in ethics, medical care organization, community medicine, and politics are discussed. The objectives are to provide students with necessary quantitative data and philosophic concepts in each of these areas to serve for discussion of the ways in which inquiry, information, and

logic can be utilized to affect the issues at hand. Another objective is to develop the interest of students in this field and in the pursuit of further knowledge in this area applicable both to patient care *per se* and to the understanding of health care systems. Students choose approximately one-half of the topics during a survey of the class prior to matriculation. At each session, about one hour is spent in formal presentation and one hour in discussion. The course is considered to be initial preparation for later teaching in nutrition, epidemiology and public health, and for various electives dealing with health care research and community aspects of medicine

(Drs. Brodman, Perkoff, Shank, Vavra, and Staff)

Biomedical Statistics. This introduction to the principles and methods of biostatistics emphasizes the concepts of statistical methodology as being essential to proper application and interpretation of statistical methods. Elementary statistical techniques illustrating the use of statistical principles in experimentation and clinical research are discussed. Second semester.

(Dr. Wette and Staff,
Division of Biostatistics)

SECOND YEAR

Pathophysiology. The Department participates in the second-year course in pathophysiology. In lectures and demonstrations there is description of the patterns of occurrence and the distribution of selected diseases in populations. Consideration is given to the variety of characteristics of host, agent, and environment which determine the occurrence of specific disorders. Procedures which may be utilized to pre-

vent or interrupt the course of disease and disability are described and evaluated. Patterns of provision of medical care and the social factors influencing health care needs are discussed. (Drs. King, Shank, and Staff)

Summer Traineeships in Physical Disability and Rehabilitation. (See Institute of Rehabilitation.) (Drs. Holloszy, Kopta)

FOURTH YEAR

Electives

Clerkship in Social Medicine. The clerkship is designed to provide the student with first-hand experience with community health problems much in the same manner that clerkships in other medical disciplines provide patient care experience in supervised settings. The clerkship will use as its clinical setting health departments, neighborhood health centers, a visiting nurse association, out-patient clinics, chronic disease units, private physician offices, group practices, and other community health resources. Students will work directly with health personnel on real community and patient problems identified first in the given agency and worked on in the community. Histories, physicals, and plans of diagnosis and treatment of these broader health issues will be developed and carried out.

Option I: In each six-week clerkship the student rotates into different clinical settings by election. In each setting a supervisory faculty plans patient-community studies with the student and oversees his work. Regular rounds are held by the director and/or participating faculty, with case presentations and discussions, preceded

or followed by faculty-student visits to the patient's home and/or place of work where desirable, so that discussions of problems and needed resources for resolution can be made real, meaningful, and effective.

Option II: Students join individual physicians in their private practices and work in their private offices caring for patients under supervision. Preventive, social, and continuing aspects of medical practice will be emphasized. Students accompany the supervisory physicians on hospital rounds, share night calls with them and, when a house or emergency call is to be made, will be contacted by the physician's exchange and will make the call with the supervisory physician. Students also attend hospital staff and committee meetings with their supervisory physicians. Each student will be requested to write a description of his six-week period, tabulating patients seen by age, race, and diagnosis. One patient will be described in detail, including such social, family, and community aspects of his problems as are applicable. A simple diary of the student's daily experience (rounds and calls made, conferences attended, etc.) will be required. It is hoped that this elective will give an overview of medical practice in internal medicine and in pediatrics, and will provide an opportunity for the students to see comprehensive medical care as it is practiced in St. Louis and as it exists in a group practice model. (Dr. Perkoff and Staff)

Disorders of Lipoprotein Metabolism and Atherosclerosis. A combined clinical and research elective in which students may acquire detailed knowledge of the metabolism of plasma lipoproteins, the epidemiology of atherosclerosis, the relationship between atherosclerosis and the disorders

of lipoprotein metabolism, and the means currently used to prevent atherosclerosis. Practical experience will be gained in the clinic and the laboratories of the Lipid Research Center, in the procedures used for the diagnosis of the dyslipoproteinemias, and in the dietary and pharmacologic modalities used in the therapy of these disorders. Participation is available in laboratory projects in the structure, synthesis, and catabolism of lipoproteins and in clinical projects utilizing both hospital and outpatients. (Dr. Schonfeld and Staff)

Family Practice Preceptorship. The Division of Health Care Research in the Department of Preventive Medicine will monitor this elective. The student wishing such an experience should find the practitioner with whom he or she wishes to work and request that this physician send Dr. Gerald T. Perkoff of the School of Medicine (1) a statement of his (the physician's) own training and experience for approval (he would need to be a bona fide licensed M.D. in practice), (2) an outline of the program he will offer the student, i.e., supervised office work and hospital visits, discussion of family problems as they bear on the patient's illness, availability of community resources, etc.), and (3) a commitment to evaluate the student's performance.

The student must then give Dr. Perkoff (1) his agreement to the proposed program, (2) a diary of patients seen and visits made and a summary of positive and negative aspects of the practice in which he was involved, and (3) a report of his study of particular problems in the community or presented by a given patient, i.e., a brief paper. This material would have to be presented in acceptable form for credit to be given. (Dr. Perkoff)

Clinical Elective. Physical disability and rehabilitation. (See Institute of Rehabilitation)
(Drs. Holloszy, Kopta)

Physical Disability and Rehabilitation. The student becomes familiar at first hand with the techniques for defining the extent of physical disability and with various approaches to its treatment. Emphasis is placed on methods used in physical, occupational, and speech therapy, and on the specialized contributions to be made by rehabilitation, social work, nursing, and vocational testing and counseling. Supervised visits are arranged to related outside facilities and agencies. Selected patients are assigned to the student for his supervision. In general, these include inpatients on the Pediatrics, Medical, Neurology, Neurosurgical, Orthopedic, and Plastic Surgery Services. Special emphasis on any one or any combination of the above services can be arranged to suit the interests of individual students. Although the student is based in the Rehabilitation Institute, he is encouraged to follow his patients in the various areas of the Medical Center where they receive care.
(Dr. Kopta)

Long-Term Care. The Division of Long-Term Care of Jewish Hospital offers a six- or twelve-week elective course to senior medical students. The Division operates a thirty-six bed service for patients with physical disabilities under the supervision of three full-time physicians. The case material is varied by the large number of patients with spinal cord injuries, strokes, Parkinson's disease, and arthritis. The Division holds an Amputee Clinic twice a month and does all the electromyographic examinations for the Jewish Hospital. The medical student serves as an extern. He

gains experience in the prescription of a rehabilitation program and follows his patients in physical therapy, occupational therapy, speech therapy, or whatever other activity is applicable. He works with the orthopedic, neurological, urological, and plastic surgery consultants who serve this unit. The details of the program can be adapted to fit the particular interests of the individual student.

(Dr. Steinberg and Staff)

Seminar Electives

Clinical Immunology. This course, through lectures and seminars, provides opportunity for broadening the knowledge and experience of students in fields of clinical immunology. The material covered includes immunization, immune deficiency states, immunological diseases, cellular hypersensitivity, complement in human disease, and cancer immunology.

(Drs. Chaplin, C. W. Parker)

Clinical Nutrition. This series of seminars is concerned with nutrient requirements of humans, review of the metabolic roles of individual nutrients, modification of nutrient requirements by disease processes, deficiency diseases, obesity, hypervitaminoses, the role of diet in the occurrence of a variety of diseases, and dietary manipulation in the treatment of various disorders. Readings are assigned; case presentations are utilized when appropriate.

(Drs. Shank, Schonfeld, Holloszy, Brennan)

AMCS-BMed 555. *Methods of Biomedical Statistics.* The principles and application of statistical methods in the health sciences, with emphasis on the treatment of statistical problems typical in biomedical and

clinical research. The usefulness and limitations of standard statistical techniques; t-, F-, and chi-square tests; correlation and regression; analysis of variance and covariance; life-tables. The rationale and applications of advanced biometrical methods: sequential analysis, especially in clinical trials; quantal response analysis; multivariate analysis; distribution-free methods. Special topics in health research: incomplete (censored) observations, mixed and competing risk distributions, classification and clustering analysis. Computer applications in biomedical statistics (with laboratory experience). (Dr. Wette)

Topics in Health Care Delivery. Student-led discussions of community medicine, social aspects of medical care systems, and alternative structures which can improve health care delivery will be directed by faculty members. Topics covered in an elective period will vary according to the faculty member assigned; course content, therefore, will not be the same for all students. The seminars will follow the design of assigned readings of specific topics, with presentations to be made by each course participant. Simultaneous participation as volunteers in the Pruitt-Igoe Project is encouraged but not required.

(Dr. Perkoff and Staff)

Research Electives

Biochemistry of Exercise. Research deals with the acute and chronic responses to exercise. Areas of interest include biochemical adaptations in muscle in response to endurance exercise and to heavy resistance exercise; effects of exercise on body composition during growth and during weight reduction; cardiac adaptations to increased work load; the serum triglyceride lowering

effect of exercise; the biochemical basis of muscle fatigue. (Dr. Holloszy)

Biostatistics. Research experience is offered in the application of statistical, mathematical, and computer methodology for experimental and clinical research problems.

(Drs. Wette, Choi)

Clinical and Experimental Nutrition. The student engages in a selected research project under supervision of staff of this laboratory. Occasional opportunities may be made to study and observe major problems of deficiency disease in other countries.

(Drs. Shank, Holloszy, Schonfeld, Brennan, Cheng)

Immunohematology. Application of serologic and immunochemical techniques in basic studies of erythrocyte autoantibodies and isoantibodies encountered in hemolytic disease of the newborn, leukemias, lymphomas, malignancies, and connective tissue diseases. Special problems in transfusion practice are also covered with blood bank personnel.

(Dr. Chaplin)

Mathematical Biology. Qualified students may engage in research concerned with the mathematical modeling and analysis (including computing techniques) of biologic processes such as tumor growth and radiation response.

(Dr. Wette)

Objective Quantitation of Spasticity. The student collaborates with the staff of the Biomedical Engineering Research and Development Unit, employing electronic instrumentation to obtain objective measurements of spasticity and impaired voluntary motor function in patients with neurological disorders. The equipment includes electrically driven and hydraulic systems, EMG



recordings, and computer analysis of data. Machine findings are correlated with clinical performance based on standardized-functional evaluation tests.

(Dr. Kopta and Staff)

Medical Care in a Group Practice. Students will select a problem of mutual interest dealing with medical care utilization, reaction to illness, screening, etc.

(Dr. Perkoff)

Studies in Adult Ambulatory Care. Studies of medical care utilization, social and economic aspects of medical care, problems in medical care organization at Barnes or affiliated hospitals or in community projects. (Dr. Perkoff)

Open Topics. Any topic related to health care delivery in a broad sense may be selected by

discussion with the supervisor.

(Dr. Perkoff and Staff)

Studies in Pediatric Ambulatory Care. Studies in medical care utilization, social and economic aspects of medical care, and problems in medical care organization at St. Louis Children's or St. Louis County Hospital or in a community project.

(Dr. Kahn)

Economic, Social, and Political Aspects of Medical Care. Studies of attitudes of physicians and patients and studies of medical care organization for the poor. (Dr. Mackie)

Data System in Medical Care Settings. Various projects related to computer systems for medical care data, uniform data sets for ambulatory services, etc.

(Dr. Mackie)

Danforth Professor and Head of the Department

Robert Ely Shank, A.B., Westminster College, 1935; M.D., Washington University, 1939. (See Department of Medicine)

Kountz Professor

Hugh Chaplin, Jr., A.B., Princeton University, 1943; M.D., Columbia University, 1947. (See Department of Medicine)

Professor and Director of the Division of Biostatistics

Reimut Wette, M.S., University of Heidelberg, 1952; D.Sc., 1955.

Professor Emeritus

C. Howe Eller (Public Health), A.B., Stanford University, 1927; M.D., University of Colorado, 1930; Ph.D., Johns Hopkins University, 1934. (Also Lecturer)

Professors

M. Kenton King, B.A., University of Oklahoma, 1947; M.D., Vanderbilt University, 1951. (See Administration and Department of Medicine)

Gerald T. Perkoff, M.D., Washington University, 1948. (See Department of Medicine and Division of Health Care Research)

Associate Professors

Sung C. Choi (Biostatistics), B.S., University of Washington, 1957; M.A., 1960; Ph.D., University of California, 1966.

John O. Holloszy, M.D., Washington University, 1957. (PHS Career Development Award) (See Department of Medicine and Irene Walter Johnson Institute of Rehabilitation)

Gustav Schonfeld, B.A., Washington University, 1956; M.D., 1960. (See Department of Medicine)

R. Dean Wochner, A.B., Arizona State University, 1956; M.D., Washington University, 1960. (Hospital Commissioner of St. Louis; Director of Health and Hospitals) (See Department of Medicine)

Assistant Professors

William C. Banton II, M.D., Howard University, 1946; M.P.H., Johns Hopkins University, 1970. (Commissioner of Health of the City of St. Louis) (See Division of Health Care Research)

Jon D. Cooksey, M.D., Tulane University, 1962. (See Department of Medicine)

Bevra H. Hahn (Clinical Immunology), B.Sc., Ohio State University, 1960; M.D., Johns Hopkins University, 1964. (See Department of Medicine)

Owen S. Kantor, M.D., University of Missouri, 1968. (See Department of Medicine and Division of Health Care Research)

Joseph A. Kopta, B.S., University of Oklahoma, 1958; M.D., 1962; M.S., University of Illinois, 1970. (See Department of Surgery and Irene Walter Johnson Institute of Rehabilitation)

Lorraine F. Lake, B.S., Washington University, 1950; M.A., 1954; Ph.D., 1962. (See Irene Walter Johnson Institute of Rehabilitation, Department of Anatomy, and Program in Physical Therapy)

M. Anita Mackie, B.S., McGill University, 1952; M.S., Cornell University, 1954; Ph.D., Michigan State University, 1962. (See Division of Health Care Research)

Gerald G. Morris, A.B., George Washington University, 1962; M.D., 1965. (See Department of Medicine)

Mary L. Parker, B.S., Florida State University, 1946; M.S., 1949; M.D., Washington University, 1953. (See Departments of Medicine and Pediatrics) (University Health Service)

Isaias Spilberg, B.S., University of San Marcos (Peru), 1956; M.D., 1963. (See Department of Medicine) (Starkloff Hospital)

John D. Vavra, B.A., University of Colorado, 1950; M.D., Washington University, 1954. (See Administration, Department of Medicine, and Division of Health Care Research)

M. Frances Watson (Social and Environmental Studies), B.S., Northeast Missouri State Teachers College, 1932; M.S.W., Washington University, 1949. (See Division of Health Care Research)

Stuart W. Weidman, A.B., Washington University, 1957; M.A., 1963; Ph.D., University of Chicago, 1965. (See Department of Biological Chemistry)

Assistant Professor (Clinical)

Franz U. Steinberg, M.D., University of Berne, 1938. (See Departments of Medicine and Surgery) (Jewish Hospital)

Instructors

Ruth E. Brennan (Nutrition), B.S., University of Tennessee, 1943; M.S., Simmons College, 1945; Sc.D., University of Pittsburgh, 1966.

Lynn Gillula, B.S.P.T., Washington University, 1968. (See Program in Physical Therapy)

Kathleen M. Haralson (Physical Therapy), B.S.P.T., University of Kansas, 1965.

Barbara B. Hixon (Biostatistics), B.S., University of Illinois, 1941.

Edward J. Miller (Clinical Immunology), B.A., St. John's University, 1958; M.D., St. Louis University, 1962. (See Department of Medicine)

Barbara J. H. Norton (Physical Therapy), B.S., Washington University, 1966.

Dorothy J. Ogilvy (Rehabilitation), A.B., Washington University, 1964; M.S.W., 1967.

Patricia F. J. Phelps (Occupational Therapy), B.S.O.T., A.B., Washington University, 1970.

Patricia R. Pickett (Nursing and Rehabilitation), B.S.N., Western Reserve University, 1959. (See Program in Physical Therapy)

Mary Ann Reh (Physical Therapy), B.S.P.T., St. Louis University, 1971.

Jean B. Rouner (Physical Therapy), B.S.P.T., Washington University, 1964.

Shirley Ann Sahrman (Physiology), B.S.P.T., Washington University, 1958; A.M., 1971.

Elizabeth A. Stoddard (Rehabilitation) B.S., Montana State University, 1954; M.D., Washington University, 1957. (Jewish Hospital)

In Sook Sunwoo (Rehabilitation), M.D., Woon-Sok University, Korea, 1959. (Jewish Hospital)

Ellen T. Tyson (Occupational Therapy and Rehabilitation), B.A., Syracuse University, 1949; M.A., 1950.

Virginia L. Woods (Physical Therapy) B.S.P.T., Washington University, 1966.

Research Instructors

Howard A. Bomze (Rehabilitation Biomedical Engineering), B.S.E.E., Drexel Institute of Technology, 1966; M.S.Bm.E., 1968; Ph.D., Washington University, 1973.

Chuan Huan Cheng, B.S., China National Central University, 1944; M.S., Cornell University, 1950; Ph.D., Michigan State University, 1955.

Lecturers

William Stoneman III, B.S., St. Louis University, 1948; M.D., 1952. (Also Director, Bi-State Regional Medical Program for Heart, Cancer, and Stroke)

Richard A. Sutter (Industrial Medicine and Rehabilitation), A.B., Washington University, 1931; M.D., 1935.

Department of Psychiatry

Instruction in psychiatry is given in the last three years of the medical course. Emphasis is on teaching psychiatry as a medical discipline, including the biological, social, and psychological mechanisms and manifestations of psychiatric illness, as well as psychological reactions to other illnesses. Recognition of current limitations of knowledge combined with an appreciation of what is known leads to a spirit of constructive skepticism. This attitude permits the student to study psychiatry in depth and broadly without preconceived theories.

SECOND YEAR

Introduction to Clinical Psychiatry. Emphasis is upon (a) effective interviewing in preparation for medical history taking, (b) evaluation of behavioral and emotional factors in patients with various kinds of illnesses, (c) the diagnosis and natural history of the major psychiatric disorders, (d) critical evaluation of conceptual and methodologic problems in psychiatry and psychology. Lectures, demonstration interviews, discussions. (Dr. Murphy and Staff)

THIRD YEAR

Psychiatry Clerkship. Students in groups of about ten spend six weeks full time on the inpatient services of Renard and Bliss Hospitals. (Drs. M. Strahilevitz, Woodruff, and Staff)

FOURTH YEAR

Electives

Outpatient Adult and Child Psychiatry. This course is intended to provide instruction and experience in the evaluation and treatment of both adult and child psychia-



try clinic patients, and to increase knowledge about community resources dealing with these patients. (Drs. Halikas, B. Herjanic, and Staff)

Selected Topics in Psychiatric and Neuropsychological Research. Students may elect to work full time in psychiatric research at any time during their elective year. Twelve weeks is the minimum time allowed; no maximum time is specified. Arrangements are made on an individual basis with the appropriate investigators.

(Drs. Cicero, Murphy, E. Robins, L. Robins, and Staff)

Child Psychiatry. This course meets once a week for formal lectures followed by group discussions. Twelve sessions are scheduled as follows: history of child psychiatry; specific diagnosis and general principles of management; theory of child development; hyperactive children; autism; examination of children with psychiatric problems; school phobia, fears, depression; retardation and reading disability; treatments in child psychiatry; accident proneness, fire setting, stealing.

(Drs. Edwards, B. Herjanic)

Neurochemistry. This course is given jointly by the Departments of Psychiatry and Pharmacology. Topics covered include carbohydrates; energy metabolism, including changes found in different functional states; amino acid metabolism and its relation to protein and transmitter synthesis; special proteins and protein metabolism; cerebral lipids, membranes, and normal and disordered lipid metabolism; transmitters and modulators; learning; growth, development, and trophic functions; cerebral blood flow, blood brain barrier.

(Drs. McDougal, B. Moore)

Staff Conferences. Students are invited to attend certain of the psychiatric staff conferences held weekly at Malcolm Bliss Mental Health Center.

Psychoanalysis. Introduction to psychoanalysis is presented at weekly seminars lasting one trimester. Some didactic material is given, but most of the session is devoted to discussion.

(Drs. Fingert, Kaplan)

*Wallace Renard Professor
and Head of Department*

Eli Robins, A.B., Rice University, 1940; M.D., Harvard University, 1943.

Wallace Renard Professor Emeritus

Edwin Francis Gildea, A.B., Colorado College, 1920; M.D., Harvard University, 1924.

*Blanche Ittleson Professor of
Child Psychiatry*

E. James Anthony, B.S., University of London, 1938; M.R.C.S., L.R.C.P., 1941; M.B., B.S., 1942; D.P.M., 1947; M.D., 1949.

Professors

Samuel B. Guze, M.D., Washington University, 1945. (See Administration and Department of Medicine)

Blake W. Moore (Biochemistry), B.S., University of Akron, 1948; Ph.D., Northwestern University, 1952. (See Department of Biological Chemistry)

George E. Murphy, B.S., Oregon State College, 1949; M.D., Washington University, 1952.

Lee N. Robins (Sociology), A.B., Radcliffe College, 1942; M.A., 1943; Ph.D., 1951.

Saul Rosenzweig (Medical Psychology), A.B., Harvard University, 1929; M.A., 1930; Ph.D., 1932. (Also Faculty of Arts and Sciences)

Kathleen Smith, B.S., University of Arkansas, 1944; M.D., Washington University, 1949. (Malcolm Bliss Hospital)

John A. Stern, A.B., Hunter College, 1949; M.S., University of Illinois, 1951; Ph.D., 1953. (Also Faculty of Arts and Sciences)

Associate Professors

Paula J. Clayton, B.S., University of Michigan, 1956; M.D., Washington University, 1960.

Donald W. Goodwin, A.B., Baker University, 1953; M.D., Kansas University, 1964.

Marijan Herjanic, M.D., Zagreb University (Yugoslavia), 1956. (Malcolm Bliss Hospital)

Richard W. Hudgens, M.D., Washington University, 1956. (See Administration)

Lucy J. King, A.B., Washington University, 1954; M.D., 1958.

James N. McClure, Jr., A.B., Washington University, 1951; M.D., 1955.

John W. Olney, B.A., Iowa University, 1956; M.D., 1963.

Barbara J. Powell (Medical Psychology), Ph.D., Washington University, 1964. (Also Faculty of Arts and Sciences) (Malcolm Bliss Hospital)

William R. Sherman (Biochemistry), A.B., Columbia University, 1951; Ph.D., University of Illinois, 1955. (See Department of Biological Chemistry)

Robert A. Woodruff, Jr., A.B., Harvard University, 1956; M.D., 1960.

Research Associate Professor

David J. Pittman (Sociology), A.B., University of North Carolina, 1949; M.A., 1950; Ph.D., University of Chicago, 1956. (Also Social Science Institute)

Associate Professor Emeritus (Clinical)

Margaret C.-L. Gildea, B.S., University of Chicago, 1923; M.D., Yale University, 1936.

Associate Professors (Clinical)

Alex H. Kaplan, B.S., College of City of New York, 1932; M.D., St. Louis University, 1936.

Patricia L. O'Neal, A.B., Washington University, 1944; M.D., 1948.

Ferris N. Pitts, Jr., A.B., Washington University, 1952; M.D., 1955.

Assistant Professor Emeritus

Lucile Healy (Social Work) A.B., College of St. Catherine, 1922; M.A., University of Minnesota, 1927; M.S.W., Washington University, 1949.

Assistant Professors

Theodore J. Cicero (Neuropsychology), B.S., Villanova University, 1964; M.S., Purdue University, 1966; Ph.D., 1968.

Plaridel C. Deza, M.D., University of Santo Tomas (Philippines), 1956. (Malcolm Bliss Hospital)

James E. Edwards (Child Psychiatry), B.A., University of Tennessee, 1959; M.D., 1962. (Malcolm Bliss Hospital)

James A. Halikas, B.S., Brooklyn College, 1962; M.D., Duke University, 1966.

Julian C. Hall (Social Work), B.S., University of Louisville, 1949; M.S., 1951. (Malcolm Bliss Hospital)

Boyd K. Hartman, A.B., University of Kansas, 1962; M.D., 1966.

Barbara M. Herjanic (Child Psychiatry), B.A., Northwestern University, 1943; B.S., Western Michigan College, 1946; M.D., University of Michigan, 1950. (See Department of Pediatrics) (Malcolm Bliss Hospital)

Paul M. Packman, A.B., Washington University, 1959; M.D., 1963.

Vernon J. Perez (Neuropsychology), B.S., Tulane University, 1957; M.S., 1960; Ph.D., Washington University, 1964. (Also Faculty of Arts and Sciences)

Daniel Pugh, B.A., Carleton College, 1960; M.D., Washington University, 1964. (Malcolm Bliss Hospital)

Theodore Reich, B.S., McGill University, 1959; M.D., 1963.

Lawrence G. Sharpe (Neuropsychology), B.A., Florida State University, 1959; M.A., San Jose State College, 1964; Ph.D., Purdue University, 1968. (Also Faculty of Arts and Sciences)

Meir Strahilevitz, M.D., Hadassah-Hebrew University Medical School (Israel), 1963. (Malcolm Bliss Hospital)

Robert H. Vanderpearl, A.B., Washington University, 1951; M.D., 1956. (Malcolm Bliss Hospital)

Jorge A. Viamontes, M.D., Havana University, 1948; Ph.D., Ignacio Agramonte University, (Cuba), 1957. (Malcolm Bliss Hospital)

Amos Welner, M.D., Hebrew University Hadassah Medical School (Israel) 1960.

Assistant Professors (Clinical)

John M. Anderson, B.S., Colorado State University, 1938; M.D., Meharry Medical College, 1938. (Malcolm Bliss Hospital)

John F. Bergmann, A.B., Washington University, 1950; M.D., 1954.

Nathan Blackman, B.S., University of Rhode Island, 1929; M.D., University of Paris, 1936.

Robert D. Brookes, A.B., DePauw University, 1934; M.D., Washington University, 1938.

Anthony K. Busch, M.D., St. Louis University, 1937.

Alan G. Craig, M.D. (MB., Ch.B.), Aberdeen University, 1951.

Robert B. Deitchman, B.A., University of Virginia, 1949; M.D., 1953.

Hyman H. Fingert, B.A., State University of Iowa, 1931; M.D., 1934.

James N. Haddock, A.B., University of Missouri, 1940; M.A., 1942; M.D., Washington University, 1943.

Edward H. Kowert, A.B., Washington University, 1940; M.D., 1943.

Wanda M. Lamb, B.S., University of Missouri, 1946; M.D., Washington University, 1948.

Sydney B. Maughs, A.B., Westminster College, 1931; M.D., Washington University, 1935.

Marie O. Mowrer, A.B., Southern Illinois University, 1947; B.S., University of Illinois, 1949; M.D., 1951.

Marcel T. Saghir, B.Sc., American University of Beirut, 1959; M.D., 1963.

Earl R. Schultz, A.B., Southeast Missouri State College, 1952; B.S.Med., University of Missouri, 1953; M.D., Washington University, 1955. (See Department of Neurology)

Frank O. Shobe, A.B., Washington University, 1938; M.D., 1942.

Harold D. Wolff, A.B., Washington University, 1952; B.S., University of Missouri, 1953; M.D., State University of Iowa, 1955.

Instructors

Bernardo G. Aleksander, M.D., University of Buenos Aires, 1959. (Malcolm Bliss Hospital)

James H. Allison, A.B., Kenyon College, 1960; M.D., University of Pittsburgh, 1965.

Alma Apostol, A.A., University of Santo Tomas (Philippines), 1952; M.D., 1961. (Malcolm Bliss Hospital)

Anna K. Bradley (Social Work), B.J., University of Missouri, 1956; M.S.W., Washington University, 1958. (Malcolm Bliss Hospital)

Lincoln B. Calvin (Child Psychiatry), B.Ed., Illinois State University, 1942; M.D., Meharry Medical College, 1951. (Malcolm Bliss Hospital)

Marguerite Cannon (Social Work), B.S., St. Louis University, 1936; M.S.W., Washington University, 1948.

Suresh Chand (Child Psychiatry), M.D., Osmania Medical College (India), 1963. (Malcolm Bliss Hospital)

Sci Young Choi, B.S., Woo Suk University (Korea), 1951; M.D., 1963. (Malcolm Bliss Hospital)

Ajit Choudhuro, B.Sc., University of Bihar, 1952; M.D., University of Calcutta, 1958. (Malcolm Bliss Hospital)

Robert C. Cloninger, B.A., University of Texas, 1966; M.D., Washington University, 1970.

Felipe Crimi, M.D., National University of Cordoba (Spain), 1946. (Malcolm Bliss Hospital)

Juan C. Fulgueira, B.S., Collegio Nacional de Funes (Argentina), 1956; M.D., Universidad Nacional de Cordoba (Spain), 1964. (Malcolm Bliss Hospital)

Eduardo A. Garcia-Ferrer, M.D., Havana University, 1952. (Malcolm Bliss Hospital)

Clifford Gilpin, S.B., University of Chicago, 1945; M.D., 1948. (Malcolm Bliss Hospital)

Sze Key Ho (Child Psychiatry), M.D., Tohoku University (Japan), 1963. (Malcolm Bliss Hospital)

Mohammed Karatela (Child Psychiatry), B.S., D.J. Science College, 1959; M.D., Dow Medical College (Pakistan), 1964. (Malcolm Bliss Hospital)

Jorge E. Kostianovsky (Child Psychiatry), M.D., University of Litoral Rosario Medical School (Argentina), 1959. (Malcolm Bliss Hospital)

Haruo Kusama (Child Psychiatry), A.B., Washington University, 1960; M.D., 1965. (Malcolm Bliss Hospital)

Leticia Laeson (Child Psychiatry), A.A. (M.D.), University of the Philippines, 1965. (Malcolm Bliss Hospital)

Natarajan Lakshminarayanan, M.B., University of Madras (India), 1960; M.S., 1960; M.D., 1967. (Malcolm Bliss Hospital)

Jane B. Landsbaum (Medical Psychology), B.A., Washington University, 1961; Ph.D., 1968. (Malcolm Bliss Hospital)

Maria E. Manion (Child Psychiatry), M.D., University of Buenos Aires, 1961. (Malcolm Bliss Hospital)

Edward P. Monnelly, B.Ph., University of Notre Dame, 1958; M.D., University of Illinois, 1968. (Malcolm Bliss Hospital)

John F. Mueller (Social Work), B.S., Washington University, 1947; M.S.W., 1952. (Malcolm Bliss Hospital)

Elizabeth C. Penick (Medical Psychology), B.A., Sophie Newcomb College, 1957; M.S., Tulane University, 1960. (Malcolm Bliss Hospital)

Young Wung Rhee (Child Psychiatry), B.A., Seoul National University (Korea), 1950; M.D., 1962. (Malcolm Bliss Hospital)

Howard E. Rogers (Medical Psychology), B.A., New York City College, 1960; M.A., Los Angeles State College, 1963; Ph.D., Arizona State University, 1969. (Malcolm Bliss Hospital)

Elizabeth M. Smith (Social Work), B.A., University of Nebraska, 1960; M.S.W., 1962.

Narendir Soorya (Child Psychiatry), M.D., Dow Medical College (Pakistan), 1964. (Malcolm Bliss Hospital)

Aharona Strahilevitz (Child Psychiatry), M.S., Hadassah-Hebrew University (Israel), 1962. (Malcolm Bliss Hospital)

Carlos Tomelleri, B.A., Colegio San Jose, 1955; M.D., Universidad Javeriana (Colombia), 1965. (Malcolm Bliss Hospital)

Richard D. Wetzel (Medical Psychology), B.A., Concordia College, 1959; B.D., Concordia Seminary, 1963.

Research Instructors

Robert Goldstein (Medical Psychology), B.A., City College of New York, 1954; Ph.D., University of Illinois, 1962. (Also Faculty of Arts and Sciences) (Malcolm Bliss Hospital)

Shirley Y. Hill (Medical Psychology), A.B., Grinnell College, 1963; Ph.D., Washington University, 1971.

William H. Holland (Electronics) A.B., Washington University, 1950. (See Department of Biological Chemistry)

Arthur S. Perumal (Biochemistry), B.Sc., Madras University, 1959; M.Sc., 1963; Ph.D., Indian Institute of Science, 1969.

Instructors Emeriti (Clinical)

Robert M. Bell, M.D., St. Louis University, 1928.

Barbara S. Kendall (Medical Psychology), A.B., Radcliffe College, 1913; Ed.M., Harvard University, 1928.

Instructors (Clinical)

Libby G. Bass (Medical Psychology), B.A., University of Illinois, 1928; M.A., Northwestern University, 1929.

William W. Clendenin, M.D., University of Tennessee College of Medicine, 1963.

William Cone, B.A., Yale University, 1949; M.D., 1954.

Juan C. Corvalan, M.D., Argentina National University, 1965. (Malcolm Bliss Hospital)

Edmund V. Cowdry, Jr., A.B., Princeton University, 1942; M.D., Washington University, 1945.

Mary E. Cox, A.B., Washington University, 1941; M.D., 1944.

Alejandro M. Datuin, A.A., University of Santo Tomas (Philippines), 1951; M.D., 1956. (Malcolm Bliss Hospital)

Wilbur H. Gearhart, B.S., Butler University, 1949; M.D., Hahnemann Medical College, 1950.

Janet Golden (Social Work), A.B., Washington University, 1924.

Robert S. Hicks, A.B., Hendrix College, 1951; M.D., University of Arkansas, 1958.

R. Eugene Holemon, A.B., Washington University, 1954; M.D., 1958.

Joseph B. Kendis (Clinical Medicine), M.D., Washington University, 1933.

Jon Tek Lum, B.A., Brown University, 1959; M.D., Tulane University, 1963. (Malcolm Bliss Hospital)

Joe E. McKinney, B.A., Westminster College, 1954; M.D., Washington University, 1958.

John H. McMahan, A.B., Southeast Missouri State Teachers College, 1939; M.D., St. Louis University, 1943.

Jay Meyer, A.B., Washington University, 1956; M.D., St. Louis University, 1960.

Jackson C. Neavles, A.B., Washington University, 1938; B.S. in Med. Sci., 1942; M.D., 1942.

Reese H. Potter, A.B., University of Kansas, 1931; B.S., University of Missouri, 1933; M.D., Washington University, 1935.

Thomas F. Richardson, B.A., Millikin University, 1959; M.D., Washington University, 1963.

Abdollah A. Sabet (Child Psychiatry), M.D., University of Tehran (Iran), 1960. (Malcolm Bliss Hospital)

Nathan M. Simon, M.S., Yale University, 1950; M.D., Washington University, 1955.

Alberto Soto, M.D., Salamanca University (Spain), 1959.

Edwin D. Wolfgram, B.A., State University of Iowa, 1954; M.D., 1959.

Fellows

Jose Alarcon, B.A., Luis Vives Institute, 1956; M.D., Faculty of Medicine (Spain), 1963.

Earni Pal, M.B.B.S., Andhra University (India), 1965.

Lourdes Pineda (Child Psychiatry), B.A., University of the Philippines, 1962; M.D., 1967. (Malcolm Bliss Hospital)

Zila Welner (Child Psychiatry), M.D., Hebrew University Hadassah Medical School (Israel), 1961. (Malcolm Bliss Hospital)

Eliza E. Wozniak (Child Psychiatry), M.D., Medical Academy of Warsaw, 1962. (Malcolm Bliss Hospital)



Department of Radiology



The Department of Radiology, housed in the Edward Mallinckrodt Institute of Radiology, provides both diagnostic and therapeutic radiological services. It connects by corridor and tunnel with Barnes, St. Louis Children's, St. Louis Maternity, McMillan, East Pavilion, Wohl, Barnard, and Renard Hospitals and the Washington University Clinics.

Laboratory facilities for research in radiation physics, radiation biology, radiation therapy, diagnostic radiology, and nuclear medicine are housed in the Institute. Four floors of the building are devoted to diagnostic roentgenographic facilities. The first floor

houses administrative and business offices, film library, and consultation viewing rooms. A book and journal library and a conference room are located on the eighth floor.

Clinical facilities for the Division of Radiation Therapy are located on the ground floor of the Institute and in Barnard Hospital. The equipment consists of a 24 Mev Betatron, a 4 Mev as well as an advanced 35 Mev linear accelerator, Cobalt 60 therapy and superficial X-rays. In addition, there are facilities and an ample stock of Cobalt 60 sources for both interstitial and intracavitary therapy. A section of cancer biology, which occupies the tenth floor and

half of the seventh floor, provides for research laboratories for the staff as well as the trainees. A well-equipped physics section includes a simulator, computerized treatment dosimetry, thermoluminescent dosimetry, and a film isodose plotter. The radiation physics and the nuclear medicine divisions have the most up-to-date equipment for radiation detection and scanning, as well as a cyclotron used to produce short-lived isotopes for research.

The undergraduate teaching program is designed to present both diagnostic and therapeutic radiology to students as part of the clinical clerkship experience. Every effort is made to provide an opportunity to correlate roentgen and clinical findings through interdepartmental conferences, consultations, and group discussions.

SECOND YEAR

Twenty-four hours of lecture devoted to diagnosis. Twelve hours of lecture devoted to radiation physics, radiation biology, radiation therapy, and nuclear medicine.

Electives

Research Electives. Opportunity is available to carry out research in the laboratories under the guidance of the staff in the fields of diagnostic radiology, therapeutic radiology, radiation physics, nuclear medicine, and radiation biology.

Nuclear Medicine. A series of 24 lectures emphasizing the principles of the tracer method as applied to clinical medicine. The material includes means of obtaining and interpreting kinetic data and the application of such data to the pathophysiologic assessment of specific disease states. Emphasis is placed on the current status of

radioisotopes in evaluating normal and pathologic clinical physiology as a transition between basic sciences and clinical medicine.

Cellular Radiation Biology. This course, which is offered as Molecular Biology 567 in the Graduate School, is concerned with cellular changes brought about by the absorption of ionizing and ultraviolet radiations. Emphasis is on mammalian cells, though other kinds of cells will be discussed as well. Particular attention is devoted to the loss of cell viability and modifications that can be made in this response by various agents.

FOURTH YEAR Electives

Clerkships in Radiology. Clinical rotations and formal teaching sessions offer a broad introduction to the role of radiology in clinical diagnosis and therapy. Six weeks. The clinical rotation consists of exposure to the various divisions within the Department (thoracic, abdominal, cardiovascular, musculoskeletal, pediatric, radiation therapy, and nuclear medicine), under the direct supervision of a senior faculty member. These sessions include an introduction to the principles of film interpretation and the opportunity to observe fluoroscopy and special procedures. Correlative conferences and lectures will be interspersed. The course can be somewhat individualized to meet the needs and interests of any student.
(Dr. Sagel)

Clerkships in Subspecialties of Radiology. Clerkships are also offered for clinical nuclear medicine or radiation therapy.
(Drs. Siegel or Powers)

Elizabeth E. Mallinckrodt Professor and Head of the Department and Director of the Mallinckrodt Institute of Radiology

Ronald G. Evens, B.A., Washington University, 1961; M.D., 1964.

Professor Emeritus

Hugh M. Wilson, A.B., Illinois College, 1924; M.D., Washington University, 1927; M.A. (hon.) Yale University, 1945.

Professors

William H. McAlister, B.S., Wayne State University, 1950; M.D., 1954. (See Department of Pediatrics)

Carlos A. Perez, B.S., University of Antioquia (Colombia), 1952; M.D., 1960.

E. James Potchen, B.S., Michigan State University, 1954; M.D., Wayne State University, 1958.

William E. Powers, B.S., University of Illinois, 1949; M.D., 1951.

Nikolaus Schad, M.D., University of Munich, 1951; Privat Dozent, University of Zurich, 1967.

Tom W. Staple, B.S., University of Illinois, 1953; M.D., 1955.

Michel M. Ter-Pogossian (Radiation Physics), B.A., University of Paris, 1942; M.S., Washington University, 1948; Ph.D., 1950.

Leonard J. Tolmach (Radiation Biology), B.S., University of Michigan, 1943; Ph.D., University of Chicago, 1951. (See Department of Anatomy)

Associate Professors

Helene Zimmerman Hill (Cancer Biology), A.B., Smith College, 1950; M.D., Brandeis University, 1964.

Frederick A. Valeriote (Cancer Biology), B.S., University of Toronto, 1962; M.A., 1964; Ph.D., 1966.

Teresa J. Vietti (Radiation Therapy), A.B., Rice University, 1949; M.D., Baylor University, 1953. (See Department of Pediatrics)

Michael J. Welch (Radiation Chemistry), B.A., Cambridge University, 1961; M.A., 1964; Ph.D., University of London, 1965. (Also Faculty of Arts and Sciences)

Associate Professors (Clinical)

A. Norman Arneson, B.S., Texas Christian University, 1924; M.D., Washington University, 1928. (See Department of Obstetrics and Gynecology)

Hyman R. Senturia, A.B., Washington University, 1929; M.D., 1933.

Assistant Professors

John O. Eichling (Radiation Physics), B.S., Northeastern Oklahoma State College, 1958; M.S., Oklahoma State University, 1959; Ph.D., Washington University, 1970.

Arnold Feldman (Radiation Physics), B.S., Pennsylvania State College, 1944; M.S., California Institute of Technology, 1948; Ph.D., University of Colorado, 1960.

John V. Forrest, B.A., University of Notre Dame, 1962; M.D., State University of New York, Downstate Medical Center, 1966.

Mokhtar Gado, M.B., B.Ch., Cairo University (Egypt), 1953.

Hsiu-san Lin, M.D. (Cancer Biology), Taiwan University, 1960; Ph.D., University of Chicago, 1968.

Robert C. McKnight, M.D., Washington University, 1961.

G. Leland Melson, B.A., Ottawa University, 1961; M.D., Washington University, 1965.

William B. Mill, Jr., M.D., University of Tennessee, 1962.

George Davis Oliver, Jr. (Radiation Physics), B.S., Lamar University, 1963; M.S., North Caro-

lina State University, 1966; Ph.D., University of Oklahoma, 1968.

Lily A. Palmer-Hanes, B.S., University of Denver, 1957; M.D., Washington University, 1960.

Michael E. Phelps (Radiation Physics), B.S., Western Washington State College, 1965; Ph.D., Washington University, 1970.

Marcus E. Raichle (Radiation Physics), B.S., University of Washington, 1960; M.D., 1964. (See Department of Neurology)

Stuart S. Sagel, B.A., Temple University, 1961; M.D., 1965.

Gary D. Shackelford, B.A., Northwestern University, 1964; M.D., Washington University, 1968. (On leave of absence)

Barry A. Siegel, A.B., Washington University, 1965; M.D., 1969.

Robert J. Stanley, B.S., St. Peter's College, 1959; M.D., St. Louis University, 1963.

Palmer G. Steward (Cancer Biology), B.A., Haverford College, 1959; M.S., University of California, 1964; Ph.D., 1968.

Carleton C. Stewart (Cancer Biology), B.A., Hartwick College, 1962; M.S., University of Rochester, 1964; Ph.D., 1967.

Assistant Professor Emeritus (Clinical)

Oscar C. Zink, M.D., Washington University, 1921.

Assistant Professors (Clinical)

William E. Allen, Jr., B.S., Howard University, 1927; M.D., 1930.

Mark D. Eagleton, Jr., A.B., Amherst College, 1947; M.D., Washington University, 1950.

Sumner Holtz, M.D., St. Louis University, 1948.

Allan H. McCown, B.S., University of Idaho, 1962; M.D., Washington University, 1964.

Wayne A. Simril, A.B., Culver-Stockton College, 1941; M.D., Washington University, 1944.

Noah Susman, A.B., Washington University, 1948; M.D., 1952. (Jewish Hospital)

Instructors

Carol R. Archer, A.B., University of California, 1952; M.D., McGill Medical School, 1956.

Fransiska Lee Brigham, A.B., Washington University, 1962; M.D., 1966.

R. Marshall Colburn, B.A., Lawrence College, 1962; M.D., Northwestern University Medical School, 1966.

Enrique Cubillo, M.D., University of Madrid, 1962.

Louis A. Gilula, M.D., University of Illinois, 1967.

Albert E. Hesker, A.B., University of Missouri, 1961; M.D., 1964.

Rexford L. Hill, B.S., University of Cincinnati, 1964; M.S., 1966. (See Biomedical Computer Laboratory)

Jeannie Jones Kinzie, B.S., Montana State University, 1961; M.D., Washington University, 1965.

Ben R. Mayes, Jr., B.A., Vanderbilt University, 1962; M.D., Washington University, 1966.

Gerald L. Palagallo, B.S., Case Institute of Technology, 1965; M.D., Case Western Reserve University, 1969.

Emily L. Smith, A.B., Washington University, 1964; M.D., 1968.

Guy E. Torstenson, A.B., Lafayette College, 1962; M.D., Albany Medical College, 1966.

Research Instructors

Kenneth A. Krohn, B.A., Andrews University, 1966; Ph.D., University of California, Davis, 1971.

Kenneth B. Larson, Met.E., Colorado School of Mines, 1951; S.M., Massachusetts Institute of Technology, 1954; S.M., 1958; Ph.D., 1964.

Judith M. Metzger, B.S., Southeast Missouri State College, 1960; M.A., University of Missouri, 1962.

Alexander N. Nakeff, B.S., University of Toronto, 1962; M.S., 1965; Ph.D., University of Rochester, 1969.

James Aaron Purdy (Radiation Physics), B.S., Lamar University, 1967; M.A., University of Texas, 1969; Ph.D., 1971.

Donald P. Ragan (Radiation Physics), B.A., New Mexico State University, 1967; M.A., University of Texas, 1969; Ph.D., 1972.

Rebecca K. Studer, B.S., State Teachers College (Kirkville), 1964; M.S., Texas Christian University, 1966.

Instructors (Clinical)

Charles L. Abramson, A.B., New York University, 1957; M.D., University of Basel, 1963.

John L. Bardsley, B.A., University of Illinois, 1961; M.D., 1964.

James W. Debnam, Jr., B.A., University of Louisville, 1958; M.D., 1962.

Beauvoir H. Edmond, B.S., Lycee Petion (Haiti), 1949; M.D., University of Haiti Medical School, 1955.

Frank W. Farrell, Jr., M.D., Bowman Gray School of Medicine, 1962.

MacDonald B. Logie, B.S., Northwestern University, 1965; M.D., 1967.

Gerald L. Shaikun, B.S., University of Kentucky, 1960; M.D., University of Chicago, 1964.

Gene W. Spector, B.A., Amherst College, 1954; M.D., Yale University, 1959.

Research Assistants

Julius Hecht, A.B., Washington University, 1950.

Robert W. Jones, B.S., University of Missouri, 1965.

Joanne Markham, B.A., Centre College, 1963.

James H. Patterson, B.A., Lincoln University, 1955.

Sandra J. Tolen.

Lecturers

Armand Diaz (Radiologic Technology), R.N., R.T., Havana University School of Medicine, 1948.

Ralph T. Overman (Nuclear Medicine), A.B., Kansas State College, 1939; M.S., 1940; Ph.D., Louisiana State University, 1943.

Consultants

Arthur L. Hughes (Physics), B.Sc., Liverpool University, 1906; M.Sc., 1908; D.Sc., 1912; B.A., Cambridge University, 1910.

Edward H. Reinhard (Hematology and Oncology), A.B., Washington University, 1935; M.D., 1939. (See Department of Medicine)

Jose M. V. Sala (Radiation Therapy), B.S., Colegio Nacional (Argentina), 1936; M.D., Universidad del Litoral (Argentina), 1944.

Mildred Trotter (Anatomy), A.B., Mount Holyoke College, 1920; Sc.M., Washington University, 1921; Ph.D., 1924; Sc.D. (hon.), Western College, 1956; Sc.D. (hon.), Mount Holyoke College, 1960. (See Department of Anatomy)



The Mary Culver Department of Surgery



The Department of Surgery includes General Surgery, Plastic and Reconstructive Surgery, Orthopedic Surgery, Neurological Surgery, Genitourinary Surgery, Cardiothoracic Surgery, and Pediatric Surgery.

The instruction begins with an introduction to surgical principles in the second year. These surgical principles for the most part are derived from fundamental concepts in the preclinical sciences which have been occupying the student since the beginning of the freshman year. Although in this course a few patients are used for the demonstration of lesions which illustrate the

principles of surgery, it is in the junior year that the first personal contact with patients occurs. Students in the third year are assigned to general surgical clinical clerkships in the hospitals, where they have an opportunity to study the frequent and important surgical diseases.

The junior surgical clerkship, lasting twelve weeks, is spent on the surgical services of the Medical Center and allied hospitals. Students attend patient rounds with residents and staff daily during the clerkship and attend seminars conducted by the general and specialty surgical staffs.

Students are encouraged to attend and assist at operations upon patients assigned to them. The physiology, pathology, chemistry, and bacteriology and pre- and post-operative care are stressed. Experience is acquired in surgical diagnosis and in the use of scientific methods that permit students to assess the effectiveness of what they do.

The fourth-year surgical program permits the senior student to select any of the following types of electives for periods of six to eighteen weeks: (1) preceptorships in which the student is assigned to a staff member for instruction and exposure to the problems of clinical practice, (2) surgical research under supervision (minimum time twelve weeks), (3) electives in pediatric surgery, thoracic and cardiac surgery, plastic and reconstructive surgery, orthopedics, neurosurgery, urology, oncology, transplantation, and emergency room medicine.

SECOND YEAR

Introduction to Surgery. Panel discussions present certain fundamental principles of physiology, biochemistry, and pathology as applied to surgery. Recitations and demonstrations are included. Two hours weekly for eighteen weeks during the second and third trimesters of the second year.

THIRD YEAR

Surgical Wards. For twelve weeks the students serve as clerks in surgery, working on the wards of the hospitals of the Medical Center. Students take case histories and make the physical examinations and the usual laboratory examinations on the patients

assigned to them. They are assigned patients with diseases treated by both surgical specialists and general surgeons. They assist at operations and do some surgical dressings. Surgical pathological material is followed as an integral part of the case study. At regular intervals the students meet with residents and attending staff in informal conferences, when questions which have arisen during the day are discussed and various aspects of the care of the patient considered. They follow their patients after discharge in the post-operative and outpatient clinic. Particular effort is made to see that students have some experience with the more frequent and important surgical lesions, and that the assigned cases are sufficiently diversified to afford an accurate perspective of surgery. Students are encouraged to consult the library frequently in the solution of problems concerning patients. One afternoon a week students participate in the tumor clinic and attend a tumor conference held jointly by the Departments of Surgery, Pathology, and Radiology. Students may attend a variety of other scheduled conferences conducted by the various divisions of the Department.

FOURTH YEAR

The electives offered senior students are principally clinical clerkships or research.

Surgical Preceptorship Elective. Each student is assigned to one of four or five selected general surgeons. The student sees patients in the physician's office, takes histories, performs physical examinations on the patients, and follows them in the hospital. The student is expected to attend the surgeon's office hours, operate with him, and make rounds with him. Reading assignments are evaluated by the surgeon to whom the

student is assigned. Projects of a clinical nature may be undertaken during this preceptorship. (Dr. Ballinger and Staff)

Surgical Research Elective. This elective introduces the student to the general approach to analyzing clinical problems of surgery in the laboratory and to familiarize him with some of the investigative methods in surgery. In general, the student gains more experience by working with an established investigator on a current project. Students are encouraged, however, to plan and execute a laboratory solution to a specific problem within the limitations of his elective time. The student participates in the weekly departmental research seminars, where investigators describe a wide range of current topics. (Dr. Ballinger and Staff)

Pediatric Surgery Elective. In this elective clerkship, the emphasis is placed on the different problems this age group presents in respect to type of surgical diseases and their care. In addition to the daily ward rounds, conferences are arranged twice a week to discuss the etiology, diagnosis, and treatment of disorders that have not been encountered on the ward. The student also attends the General Surgery Pediatric Clinic, where he participates in postoperative follow-up of patients. Once a week the student attends the Pediatric Oncology Clinic. Pertinent pediatric X-ray films are reviewed regularly. (Dr. Ternberg)

Principles of Thoracic and Cardiac Surgery. This course presents a broad background in surgical disease of the thorax. The student follows his patients through all phases of diagnosis, surgical treatment, and postoperative management. He is at liberty to pursue special areas of interest. For example,

a patient with a pulmonary problem may provoke a critical study of the various tests of pulmonary function. A cardiac surgery patient may kindle interest in catheterization techniques, physiology of cardiopulmonary bypass, or a comparative evaluation of surgical methods. There are a number of regularly scheduled conferences and seminars the student may attend. In addition, seminars are held twice weekly for the purpose of discussing pertinent literature and resolving problems. Each student is asked to select a topic for review at the beginning of the elective, and to present a seminar on his work in the final week.

(Dr. Weldon and Staff)

Plastic and Reconstructive Surgery Preceptorship. The aim of this elective is to familiarize the student with some of the problems in plastic and reconstructive surgery. The student has an opportunity to discuss the application of principles of tissue repair to a variety of surgical conditions, including burns and other forms of trauma, and major soft tissue injury associated with cancer surgery. There is a constant personal relationship between the student and the attending staff during the period. (Dr. Weeks and Staff)

Orthopedic Surgery Elective. Clinical clerkship electives are available for six weeks, during which time the student attends conferences and outpatient clinics and serves in the various orthopedic clinical divisions. The Orthopedic Service does not have interns, and medical students electing this clerkship serve as an active and integral part of the team. The conferences that they are expected to attend consist of:

X-ray Conference, 12:00 to 1:00 p.m.,
Monday, Tuesday, and Friday.

Saturday morning conferences at Barnes Hospital and at Shriners Hospital.

Amputee Clinic, Tuesday afternoon.

Hand Conference, 1:00 p.m., Thursday.

Children's Clinic, Wednesday afternoon.

(Dr. Stein and Staff)

Neurosurgery Elective. The goal is to provide an overview of neurological surgery. Responsibilities include patient work-up, pre- and postoperative care, and attendance at selected neurosurgical operations. Daily morning rounds are held with a member of the attending staff. At these rounds a patient is presented and the disease entity discussed in detail. Students also work in the Neurosurgical Clinic and attend the weekly combined conference in neuropathology, neurology, and neurosurgery. In addition they attend the junior class Saturday morning lectures, which include patient presentation. (Dr. Schwartz and Staff)

Urology Elective. A six-week clinical clerkship offers the interested student an adequate knowledge of the type of problems with which the clinical urologist deals. The student is taught the basic diagnostic procedures and the management of surgical and nonsurgical patients on both the private and ward services under the supervision of the attending staff and house officers. The experience involves direct care of patients in the clinics, as well as the urologic admissions to the hospital. Daily morning and evening rounds of all patients on a particular service are conducted by the responsible resident. Two additional teaching rounds for the house staff and students are held weekly. In addition, the student attends daily X-ray conferences, the weekly staff conference, and the pathology conference and journal club conducted every

other week. The student is given an opportunity to assist in open and endoscopic surgery, as well as in the various diagnostic procedures performed in the cystoscopy and urography section.

(Dr. Royce and Staff)

Oncology Elective. Students electing to study the theoretical and practical aspects of the epidemiology, diagnosis, treatment, and prognosis of neoplastic diseases in man may select a program (subject to the approval of the Tumor Committee) which includes interdepartmental experience in several of the following areas of knowledge:

1. Surgical Pathology of Neoplasms. (Dr. Bauer)
2. Surgical Pathology of Gynecologic Neoplasms. (Dr. Dehner)
3. Neoplasms in Children. (Dr. Vietti)
4. Head and Neck Cancer. (Dr. Ogura)
5. Radiation Therapy of Neoplasms. (Dr. Powers)
6. Hematologic Neoplastic Disease. (Dr. Reinhard)

All students attending the oncology elective will be expected to attend regularly the following conferences:

1. Tumor Conference, 3:00 to 4:00 p.m., Wednesday.
2. GYN Cancer Conference, 8:00 to 9:00 a.m., Monday.
3. E.N.T. Tumor Conference, 12:00 noon every other Thursday.
4. Neoplastic Hematologic Conference, 8:00 to 9:00 a.m., Wednesday.
5. Cancer Workshop, 6:30 to 8:00 p.m., first Monday of each month, September to June.



Each student taking an elective in oncology must select (or be assigned) a problem for study in the field. Each student is expected to report to his peers and instructors on the selected subject at the end of the elective period. Members of the Tumor Committee evaluate the report, as well as the student's performance during the elective.

(Drs. Bauer, Butcher, and Staff)

Ellis Fischel Elective. The Ellis Fischel State Cancer Hospital and its Cancer Research Center jointly have departments of Surgery, Medicine, Radiotherapy, Anatomical Pathology, Biostatistics, and Biochemistry, with full-time teaching-research oriented staffs. Active training programs are available in all of these departments. Stu-

dents are welcome to take electives in any department. The staff is of the opinion that medical students derive the greatest benefit from a split elective, including surgery, radiation therapy, anatomical or tumor pathology, and internal medicine (with emphasis on cancer chemotherapy and hematology). Since the Hospital attends approximately ten per cent of the cancer patients in the State and maintains a comprehensive follow-up in the outpatient clinic, the clinical experience derived from participation as a working member of the clinical teams in these various departments gives the students an excellent training experience in clinical oncology. A short-term clinical research project during the clerkship is encouraged. This is either initiated by the student or is assigned by a member of the clinical staff. Training in the design of a clinical experiment and analysis of clinical data is coordinated through the Department of Biostatistics. The student has the choice of concentrating his entire elective experience on a single service if he desires.

(Dr. Spratt and Staff)

Transplantation Elective. This orientation course, designed to offer the student an overview of the entire field of organ transplantation, is rigorous enough to provide the student with the ability to discuss current problems with other investigators in the field.

(Dr. Newton and Staff)

Emergency Room Elective. The student participates actively under supervision in the emergency room services of the Medical Center and allied hospitals. In addition, he attends daily formal lectures, seminars, and radiology and EKG conferences to further his training in emergency medicine.

(Dr. Klippel and Staff)

*Bixby Professor of Surgery and
Head of the Department*

Walter F. Ballinger, M.D., University of Pennsylvania, 1948.

Harry Edison Professor of Surgery

Arthur E. Baue, A.B., Westminster College, 1950; M.D., Harvard Medical School, 1954. (Jewish Hospital)

Professors

Harvey R. Butcher, Jr., A.B., Central College, 1941; M.D., Harvard University, 1944.

George J. Hill II, A.B., Yale College, 1953; M.D., Harvard Medical School, 1957. (Director, Washington University Surgical Service, Starkloff Hospital)

William T. Newton, B.S., Yale University, 1947; M.D., 1950. (Head, Washington University Surgical Service, St. Louis V.A. Hospitals)

Professor (Clinical)

Eugene M. Bricker, M.D., Washington University, 1934.

Associate Professors

John A. Collins, A.B., Fordham University, 1955; M.D., Columbia University, 1959.

Alexander S. Geha, B.S., American University of Beirut, 1955; M.D., 1959. (Jewish Hospital)

Carl E. Lischer, A.B., University of California, 1933; M.D., Washington University, 1937.

Leslie Wise, B.S., University of Sydney; M.D., 1957.

Associate Professors Emeriti (Clinical)

Robert W. Bartlett, B.S., University of Michigan, 1926; M.D., 1930.

J. G. Probst, M.D., Loyola University, 1917.

Franklin E. Walton, B.S., Shurtleff College, 1923; M.D., Washington University, 1927; Sc.D. (hon.), Shurtleff College, 1952.

Associate Professors (Clinical)

Heinz Haffner, B.S., University of Arizona, 1931; M.D., Washington University, 1935.

Carl J. Heifetz, B.S., Washington University, 1927; M.D., 1929.

Falls B. Hershey, B.S., University of Illinois, 1939; M.D., Harvard University, 1943.

C. Alan McAfee, B.S., Washington State College, 1938; M.D., Washington University, 1942.

Lawrence W. O'Neal, M.D., Washington University, 1946.

James M. Stokes, M.D., Washington University, 1948.

Assistant Professors

Charles B. Anderson (Junior Faculty Clinical Fellow of the American Cancer Society), A.B., Johns Hopkins University, 1958; M.D., Yale University, 1962. (Starkloff Hospital)

Thomas H. Covey, Jr., A.B. West Virginia University, 1957; M.D., Harvard University, 1961. (Jewish Hospital)

Robert C. Donaldson, A.B., University of Missouri, 1941; M.D., Washington University, 1944. (St. Louis V.A. Hospitals)

Bernard M. Jaffe, A.B., University of Rochester, 1961; M.D., New York University, 1964. (On leave of absence)

Allen P. Klippel, A.B., Amherst College, 1944; M.D., St. Louis University, 1946.

Hugh O. O'Kane, M.B., B.Ch., B.A.O. in Med., Queen's University (Belfast, Ireland), 1960. (Jewish Hospital)

Gordon W. Philpott, B.S., Yale University, 1957; M.D., Washington University, 1961.

Mohammed M. Sayeed (Surgical Physiology), B.S., Osmania University (India), 1956; Ph.D., University of Miami, 1964. (Jewish Hospital)

Research Assistant Professors

Irshad H. Chaudry (Biochemistry), M.S., Sind University (Pakistan), 1966; Ph.D., Monash University (Australia), 1970. (Jewish Hospital)
Harry W. Margraf, M.Sc., Polytechnicum (Milan, Italy), 1941; D.Sc., Milan University, 1943.

Assistant Professors (Clinical)

Cyril J. Costello, B.S., University of Texas, 1935; M.D., 1939.
Richard H. Fallon, B.S., Boston College, 1952; M.D., Harvard University, 1956.
Ralph J. Graff, A.B., Washington University, 1957; M.D., 1957. (See Department of Microbiology) (St. Louis V.A. Hospitals)
Jerome F. Levy, A.B., Washington University, 1954; M.D., 1958.
Stanley L. London, M.D., Washington University, 1949. (Jewish Hospital)
Robert H. Lund, M.D., Washington University, 1949.
Leo A. Sachar, A.B., Washington University, 1936; M.D., 1940.
Sam F. Schneider, A.B., Washington University, 1932; M.D., 1936. (Jewish Hospital)
William D. Shieber, M.D., Washington University, 1953.
Richard G. Sisson, A.B., Harvard University, 1943; M.D., Yale University, 1946.
Andrew D. Spencer, A.B., Indiana University, 1951; M.D., 1954.
George L. Tucker, A.B., Columbia University, 1952; M.D., Harvard University, 1956.
Willard B. Walker, M.D., Washington University, 1946.
George L. Watkins, Jr., A.B., Westminster College, 1938; M.D., Washington University, 1942.

Instructors

James R. Hurd, A.B., Princeton University, 1957; M.D., Harvard University, 1961. (Starkloff Hospital)

Robert J. Kingsbury, A.B., Asbury College, 1956; M.D., University of Michigan, 1960. (Jewish Hospital)

Asrar Malik (Surgical Physiology), B.Sc. (hons.), University of Western Ontario, 1968; M.Sc., University of Toronto, 1969; Ph.D., 1971. (Jewish Hospital)

Research Instructors

Paul V. Belkin (Experimental Surgery), D.V.M., Vienna Veterinary College, 1944.
Mary A. Wurth, B.S., St. Louis University, 1961; M.S., 1963; Ph.D., University of Missouri, 1969. (Jewish Hospital)

Instructors (Clinical)

Robert R. Anschuetz, M.D., Washington University, 1940.
Kenneth J. Bennett, M.D., Tulane University, 1965. (Jewish Hospital)
Richard V. Bradley, M.D., Washington University, 1952.
Arthur R. Dalton, B.S., University of Missouri, 1938; B.S. Med., Northwestern University, 1940; M.D., 1941.
Virgil O. Fish, M.D., Washington University, 1930.
Fleming B. Harper, M.D., Medical College of Virginia, 1950.
G. Lynn Krause, Jr., A.B., Amherst College, 1950; M.D., University of Pennsylvania, 1954.
Alan M. Londe, A.B., Washington University, 1957; M.D., 1961. (Jewish Hospital)
Sherwin H. Malt, A.B., Washington University, 1962; M.D., University of Missouri, 1966. (Jewish Hospital)
Eugene N. Mitchell, B.S., St. Louis University, 1955; M.D., University of Missouri, 1960.
George A. Oliver, A.B., Washington University, 1948; M.D., 1952.
Joseph C. Peden, Jr., B.S., Harvard University, 1940; M.D., 1943.

Mather Pfeiffenberger, Jr., A.B., Yale University, 1941; M.D., Harvard University, 1944.

George B. Rader, M.D., Washington University, 1951.

Frank O. Richards, A.B., Talladega College, 1944; M.D., Howard University, 1947.

Belmont R. Thiele, M.D., St. Louis University, 1948. (St. Louis County Hospital)

George C. Wee, M.D., University of Louisville, 1931.

Assistant

Raj N. Mohapatra, I.Sc., Utkal University (India), 1953; F.R.C.S., Royal College of Surgeons (Edinburgh), 1967. (St. Louis V.A. Hospitals)

Research Assistant

Joseph Inukai. (See Department of Neurology)

Assistants (Clinical)

Arthur I. Auer, B.S., Massachusetts Institute of Technology, 1952; M.D., Washington University, 1956.

Leslie F. Bond, A.B., University of Illinois, 1948; M.D., Meharry Medical College, 1952.

Katherine J. Crawford, B.S., Michigan State College, 1942; M.D., Woman's Medical College of Pennsylvania, 1946.

James R. Criscione, B.S., Youngstown University, 1943; M.D., St. Louis University, 1951.

Frederick W. Klinge, A.B., University of Missouri, 1938; M.D., Washington University, 1942.

Samuel Lugo, B.S., St. Louis University, 1954; M.D., 1958.

Lester J. Nathan, B.A., University of Omaha, 1949; M.D., University of Nebraska, 1952.

Meredith J. Payne, A.B., Washington University, 1947; M.D., 1950.

Keith E. Pipes, A.B., Fresno State College, 1950; M.D., Washington University, 1954.

Robert Rainey, B.S., Yale University, 1944; M.D., Washington University, 1947.

Donald C. Sauer, A.B., Washington University, 1956; M.D., 1960.

Lecturer

John S. Spratt, Jr., M.D., Southwestern Medical School of the University of Texas, 1952. (Ellis Fischel State Cancer Hospital)

Cardiothoracic Surgery

Professor

Clarence S. Weldon, A.B., University of Michigan, 1951; M.D., Johns Hopkins University, 1955.

Professors (Clinical)

Thomas H. Burford, A.B., University of Missouri, 1931; B.S.Med., 1933; M.D., Yale University, 1936.

Thomas B. Ferguson, B.S., Duke University, 1943; M.D., 1947.

Associate Professor

Richard E. Clark, B.S.E., Princeton University, 1957; M.D., Cornell University, 1960; M.S., University of Virginia, 1962.

Associate Professor (Clinical)

Charles L. Roper, A.B., Colorado College, 1949; M.D., University of Colorado, 1953.

Assistant Professor (Clinical)

Martin Bergman, A.B., Washington University, 1942; M.D., 1945.

Genitourinary Surgery*Professor Emeritus*

Justin J. Cordonnier, B.S., Washington University, 1926; M.D., 1928.

Professor

Saul Boyarsky, B.S., University of Vermont, 1943; M.D., 1946. (See Department of Pharmacology)

Professor Emeritus (Clinical)

Dalton K. Rose, M.D., Washington University, 1915.

Associate Professor

Charles B. Manley, Jr., A.B., University of Missouri, 1955; M.D., 1958. (See Department of Pediatrics) (Jewish Hospital)

Research Associate Professor

Peregrina N. C. Labay, B.S. (Ed.), University of St. Thomas (Virgin Islands), 1947; B.S. (Med.), 1949; M.D., 1954. (See Department of Anatomy)

Associate Professor Emeritus (Clinical)

Rogers Deakin, M.D., Washington University, 1922.

Associate Professors (Clinical)

Morris Abrams, B.S., University of Illinois, 1934; M.D., 1937.

William T. Bowles, M.D., Stanford University, 1955.

Robert K. Royce, B.S., University of Mississippi, 1939; M.D., Washington University, 1942.

Carl A. Wattenberg, A.B., University of Kansas, 1934; M.D., 1937.

Assistant Professors

James G. Bucy (Academic Trainee, NIAMD, in Genitourinary Scholarship Program), B.S., Haverford College, 1958; M.D., Northwestern University, 1962.

Bruce A. Lucas, B.S., Duke University, 1961; M.D., 1965.

Research Assistant Professors

Ovidio D. Escalante, B.S., University of El Salvador (San Salvador), 1957; M.D., 1960.

Franz U. Steinberg, M.D., University of Berne, 1938. (See Departments of Medicine and of Preventive Medicine and Public Health) (Jewish Hospital)

Steven Weinberg, B.S., Drexel University, 1965; S.M., Massachusetts Institute of Technology, 1967; Ph.D., 1970.

Instructors (Clinical)

J. Byron Beare, B.S., St. Louis University, 1936; M.D., 1939; M.S., University of Minnesota, 1947.

M. Richard Carlin, B.A., Dartmouth College, 1944; M.D., Yale University, 1947.

Saul Klein, M.D., Syracuse University Medical Center, 1959.

Richard P. Parsons, B.S., Missouri Valley College, 1954; M.D., Washington University, 1958.

Herbert Sunshine, A.B., Washington University, 1950; M.D., 1954.

Assistant (Clinical)

Jules H. Kopp, M.D., University of Arkansas, 1951.

Scholar

Jack D. Clayton, B.A., Rice University, 1960; M.D., Tulane Medical School, 1964.

Neurological Surgery

August A. Busch, Jr., Professor of Neurological Surgery

Henry G. Schwartz, A.B., Princeton University, 1928; M.D., Johns Hopkins University, 1932.

Professor Emeritus

James O'Leary (Experimental Neurological Surgery), B.S., University of Chicago, 1925; Ph.D., 1928; M.D., 1931. (See Department of Neurology)

Professors

William S. Coxe, B.S., Hampden-Sydney College, 1945; M.D., Johns Hopkins University, 1948.

Sidney Goldring, M.D., Washington University, 1947.

Professor Emeritus (Clinical)

Leonard T. Furlow, B.S., Emory University, 1923; M.D., 1925.

Assistant Professor

Robert A. Ratcheson, B.S., Northwestern University, 1962; M.D., 1965.

Orthopedic Surgery

Professors

Fred C. Reynolds, A.B., Washington University, 1931; M.D., 1934.

Arthur H. Stein, Jr., A.B., Amherst College, 1946; M.D., Washington University, 1948.

Associate Professor Emeritus (Clinical)

Oscar P. Hampton, Jr., M.D., University of Tennessee, 1928.

Assistant Professors

Virginia M. Badger, B.A., Occidental College, 1950; M.S., University of Southern California, 1957; M.D., Woman's Medical College of Pennsylvania, 1961. (On leave of absence)

Marshall B. Conrad, A.B., Westminster College, 1942; M.D., Washington University, 1945.

James C. Ellsasser, M.D., Washington University, 1964.

Joseph A. Kopta, B.S., University of Oklahoma, 1958; M.D., 1962; M.S., University of Illinois, 1970. (See Department of Preventive Medicine and Public Health and Irene Walter Johnson Institute of Rehabilitation)

H. Relton McCarroll, Jr., A.B., Princeton University, 1958; M.D. Columbia University, 1962.

Ronald E. Rosenthal (U.S. Public Health Service Special Fellow), M.D., Washington University, 1961.

Research Assistant Professor

David J. Simmons, B.A., Boston University, 1954; M.A., Clark University, 1956; Ph.D., University of Chicago, 1959.

Assistant Professors (Clinical)

Lee T. Ford, Jr., M.D., University of Tennessee, 1940.

Earl P. Holt, Jr., B.A., Duke University, 1942; M.D., 1945.

Robert E. Kuhlman, A.B., Washington University, 1953; M.D., 1956.

James O. Lottes, Ph.B., St. Louis College of Pharmacy, 1926; Ph.G., 1928; A.B., University of Missouri 1934; B.S., 1935; M.D., University of Louisville, 1937.

Harry C. Morgan, B.A., University of Missouri, 1949; B.S., 1951; M.D., Harvard University, 1953.

George E. Scheer, A.B., Municipal University of Wichita, 1940; M.D., Washington University, 1943.



Instructors (Clinical)

Vilray P. Blair, Jr., M.D., Washington University, 1939.

William S. Costen, A.B., Princeton University, 1950; M.D., Washington University, 1954.

Ronald C. Hertel, A.B., Washington University, 1952; M.D., 1956.

Edward C. Holscher, A.B., University of Missouri, 1931; B.S., 1933; M.D., Harvard University, 1935.

W. Edward Lansche, A.B., Washington University, 1948; M.D., 1952.

Stanley M. Leydig, B.A., Montana State University, 1930; M.D., Washington University, 1934.

Marvin R. Mishkin, M.D., University of Illinois, 1955.

Newton B. White, M.D., University of Cincinnati, 1957.

Assistants (Clinical)

John P. Arnot, B.A., Rice University, 1954; M.D., Yale University, 1958.

Alan H. Morris, M.D., University of Illinois, 1963.

Herman E. Russell, B.A., New York University, 1950; M.D., University of Geneva, 1956.

George R. Schoedinger III, M.D., University of Oregon Medical School, 1962.

Pediatric Surgery

Professor

Jessie L. Ternberg, A.B., Grinnell College, 1946; Ph.D., University of Texas, 1950; M.D., Washington University, 1953. (See Department of Pediatrics)

Plastic and Reconstructive Surgery

Professor

Paul M. Weeks, A.B., Duke University, 1954; M.D., University of North Carolina, 1958.

Professor (Clinical)

Minot P. Fryer, A.B., Brown University, 1936; M.D., Johns Hopkins University, 1940.

Assistant Professor

Robert C. Wray, Jr., B.S., University of Arkansas, 1961; M.D., Washington University, 1963.

Assistant Professor (Clinical)

Marcy A. Goldstein, M.D., Washington University, 1951.

Instructors (Clinical)

Joseph W. Eades, A.B., Amherst College, 1952; M.D., Washington University, 1960.

George H. Zografakis, M.S., Rutgers University, 1955; M.D., State University of New York, Upstate Medical College, 1959.

Research Associate

Richard Lowrey, B.S., Washington University, 1966; M.S., 1970.

Consultant in Oral Surgery

Leroy W. Peterson, D.D.S., University of Michigan, 1940. (Also School of Dentistry)

Teaching and Research Divisions

BIOMEDICAL COMPUTER LABORATORY

The Biomedical Computer Laboratory collaborates with research investigators in the application of modern information-processing techniques to problems in biology and medicine. Research and training is offered to medical students and graduate students in applications of mathematical techniques to biomedical problems and in applications concerning information processing in the research laboratory.

Currently one of the foremost aids in laboratory applications of digital computers is the LINC (Laboratory Instrument Computer), a small stored-program computer which was designed specifically for the biology laboratory. LINC computers are available to students. Several Programmed Consoles, a smaller computer designed at BCL, are also available, and many computers of both types are connected by telephone lines to an IBM 360/50 at the Washington University Information Processing Center.

Externships in biomedical computing of two or three months' duration are offered during the summer for students who have completed the first year of the medical school curriculum. Opportunities to carry out research are also available to graduate students on a year-round basis. For other related courses see the Interdepartmental Program in Biomedical Engineering.

The Biomedical Computer Laboratory is affiliated with the Computer Systems Laboratory located in nearby quarters at the School of Medicine. The mission of the Computer Systems Laboratory is the design and development of advanced computer systems with a current focus on the de-

velopment of a compatible set of "macro-modules" for which arbitrary large, complex, or specialized computer systems can be assembled. These systems are being applied to several challenging problems in physiology and medicine.

Elective Courses

512. *Digital Computers for Laboratory Use.* Methods of using small digital computers with laboratory instruments. Basic programming, data collection and conversion, data processing, digital control, output techniques. Credit 3 units. (Dr. Holmes)

Physical and Mathematical Principles of Tracer Kinetics. Theoretical foundations of tracer-kinetic methods. Topics covered are differential equations for conservation of tracer mass, applications of elementary linear systems theory, stochastic and compartmental models, methods of accounting for tracer recirculation, and methods of data-processing. (Dr. Larson)

Programming for Medical Information Systems. An interpretive language designed for medical information systems is described, with programming examples from hospital and ambulatory care settings. The language used is MUMPS (MGH Utility Programming Systems). Three hours of class work plus laboratory each week for six weeks. (Mr. Long)

Introduction to Programming the Laboratory Computer. Topics covered are generalized description of logical design of

Note—The number preceding the course title indicates that the course carries credit in the Graduate School of Arts and Sciences or in the Sever Institute.

digital computers; decimal, octal, and binary number systems; machine language programming for the LINC. Three hours of class work plus laboratory each week for six weeks.
(Mr. McDonald)

Selected Topics in Programming. Description and comparison of several laboratory computers, including the LINC, LINC-8, PDP-12, and PC; usage and design of algorithm for programming. Three hours of class work a week for six weeks. Prerequisite, Introduction to Programming the Laboratory Computer or consent of instructor.
(Mr. McDonald)

Professor and Director

Jerome R. Cox, Jr., S.B., Massachusetts Institute of Technology, 1947; S.M., 1949; Sc.D., 1954. (See Department of Physiology and Biophysics and Division of Health Care Research) (Also School of Engineering and Applied Science)

Associate Director and Assistant Professor

Lewis J. Thomas, Jr., B.S., Haverford College, 1953; M.D., Washington University, 1957. (See Departments of Anesthesiology and of Physiology and Biophysics)

Associate Professor

Donald L. Snyder, B.S., University of Southern California, 1961; M.S., Massachusetts Institute of Technology, 1963; Ph.D., 1966. (Also School of Engineering and Applied Science)



Assistant Professor

William F. Holmes, A.B., Princeton University, 1953; Ph.D., University of Pennsylvania, 1960. (See Department of Biological Chemistry)

Research Associates

A. Maynard Engebretson, B.S., University of Minnesota, 1958; M.S., Washington University, 1963; Sc.D., 1970. (Also Central Institute for the Deaf)

Rexford L. Hill, B.S., University of Cincinnati, 1964; M.S., 1966. (See Department of Radiology)

John W. Lewis III, B.S., Georgia Institute of Technology, 1966; M.S., 1968; Ph.D., 1971. (See Department of Pathology)

Thomas F. Martin, B.S., St. Louis University, 1961; M.D., 1965. (See Department of Medicine)

Floyd M. Nolle, B.S., Washington University, 1961; M.S., 1968; Sc.D., 1972. (See Department of Medicine)

Lecturers

Walter E. Long, B.S., Washington University, 1960; M.S., 1968.

Michael D. McDonald, B.S., St. Louis University, 1957.

Assistant Director for Engineering

Vernon W. Gerth, Jr., B.E., Vanderbilt University, 1960; M.S., 1964.

Administrative Officer

Edward L. MacCordy, B.S., Tufts University, 1947; M.S., Rensselaer Polytechnic Institute, 1957. (Also Computer Systems Laboratory and Office of the Vice Chancellor for Research)

WILLIAM GREENLEAF ELIOT
DIVISION OF CHILD PSYCHIATRY

The Division of Child Psychiatry offers a varied teaching program for Residents in Psychiatry and Fellows in Child Psychiatry through its Child Psychiatry Clinics and Walk-In Clinic at 369 North Taylor Avenue, the St. Louis County Division of Mental Diseases, and the Youth Center at the St. Louis State Hospital. Trainees are assigned to these various units where they participate in complete diagnostic evaluations and see patients in treatment under the supervision of the unit doctor and the Professor of Child Psychiatry. Seminars in child psychiatry, child development, individual and group treatment, clinical psychology, social work, and research are held weekly. New methods of teaching and observation (video-taped sessions, one-way screens, clinical films) are in regular use. The Child Development Research Center, attached to the Division of Child Psychiatry, carries out systematic research in child psychiatry with the help of funds from the National Institutes of Health. Fellows in Child Psychiatry with special research interests can participate in the various research programs.

Director and Blanche F. Ittleson Professor

E. James Anthony, B.S., University of London, 1938; M.R.C.S., L.R.C.P., 1941; M.B., B.S., 1942; D.P.M., 1947; M.D., 1949.

Director of the Child Psychiatry Clinics and Assistant Professor of Child Psychiatry

Thomas C. Brugger, B.S., University of Wisconsin, 1950; M.D., 1953.

Assistant Professor

Loretta K. Cass (Medical Psychology), B.A., Colorado College, 1934; M.A., 1942; Ph.D.,

Ohio State University, 1950. (Also Faculty of Arts and Sciences)

Research Assistant Professor

Manon McGinnis (Psychiatric Social Work), B.A., Westhampton College, 1927; M.S.W., Pennsylvania School of Social Work, 1929.

Assistant Professors (Clinical)

Roy M. Mendelsohn (Child Psychiatry), B.S., University of Illinois, 1950; M.D., 1952.

Paul H. Painter (Child Psychiatry), M.D., St. Louis University, 1947. (See Department of Pediatrics)

Adolfo E. Rizzo (Child Psychiatry), M.D., Buenos Aires University, 1955.

Instructor Emeritus

Louetta Berger (Psychiatric Social Work), B.S., University of Wichita, 1941; M.S.W., Washington University, 1946. (Also Lecturer)

Instructors

Ebrahim Amanat (Child Psychiatry), M.D., Tehran University Medical Faculty (Iran), 1959.

Doris C. Gilpin (Child Psychiatry), B.S., Drury College, 1944; M.D., University of Chicago School of Medicine, 1948.

Diane F. Gittinger (Psychiatric Social Work), B.A., Emmanuel College (Boston), 1968; M.S.S.S., Boston University, 1971.

William S. Gorman (Psychiatric Social Work), B.A., Marquette University, 1964; M.S.W., St. Louis University, 1968.

Katheleen L. Lizama (Psychiatric Social Work), B.A., Mundelein College, 1965; M.S.W., New York University, 1970.

Nancy J. Lowe (Medical Psychology), Ph.B., University of Chicago, 1947; M.A., 1950; Ph.D., Washington University, 1970.

Janet S. Portell (Psychiatric Social Work), B.A., Southern Illinois University (Edwardsville), 1965; M.S.W., Washington University, 1967.

Syed A. Raza (Child Psychiatry), M.D., Dow Medical College (Pakistan), 1959.

Sandra W. Russ (Medical Psychology), B.S., University of Pittsburgh, 1966; Ph.D., 1970.

Research Instructors

Lois E. Franklin (Clinical Medical Psychology), B.A., Blackburn College, 1950; M.A., MacMurray College, 1952.

Cynthia L. Janes (Medical Psychology), B.A., University of Oklahoma, 1965; Ph.D., 1970.

Emel A. Sumer (Child Psychiatry), M.D., University of Istanbul School of Medicine, 1957.

Instructors (Clinical)

Edith C. Robinson (Child Psychiatry), A.B., Randolph-Macon College, 1927; M.S., University of South Carolina, 1928; M.D., Johns Hopkins University, 1932. (See Department of Pediatrics)

Marylyn Voerg (Medical Psychology), B.A., University of Florida, 1950; Ph.D., 1964.

Assistants

Pamela F. Maltz (Psychiatric Social Work), B.S., Syracuse University, 1967; S.M., Simmons College School of Social Work, 1971.

Judith L. Schechtman (Psychiatric Social Work), B.A., Northwestern University, 1968; M.S.W., Washington University, 1970.

Research Assistants

Harriet S. Lander (Medical Psychology), A.B., Washington University, 1964; M.S., St. Louis University, 1968.

John L. Rosenkoetter (Medical Psychology), B.A., Concordia Senior College (Fort Wayne), 1965.

Linda H. Teel (Medical Psychology), B.A., Vanderbilt University, 1970.

Consultants

Eleanore T. Kenney (Medical Psychology), A.B., Bryn Mawr College, 1937; Ph.D., Washington University, 1964.

Robert E. Lefton (Medical Psychology), A.B., Washington University, 1953; Ph.D., 1958

DIVISION OF GERONTOLOGY

The Division of Gerontology is located at the St. Louis Chronic Hospital, 5600 Arsenal Street. The Division conducts a research laboratory at the Hospital.

Through a bequest from the late Mrs. Ina Champ Urbauer, a fund has been established for research in gerontology and allied fields.

Director of Research

John E. Kirk, M.D., University of Copenhagen, 1929. (See Department of Medicine)

Research Instructor

Teofil Kheim, M.D., University of Budapest, 1934. (See Department of Medicine)



DIVISION OF HEALTH CARE RESEARCH

The Division of Health Care Research is an extradepartmental unit of the School, directly responsible to the Dean. Staff members hold appointments in a variety of departments of the School of Medicine and the University; indeed, broad multidisciplinary staffing is considered appropriate for address to the complicated sociomedical and economic problems of health care and education. The primary function of the divisional staff is to contribute to the solution of such problems. As such, its responsibilities include:

Experimental Programs in Medical Care. The Division operates the Medical Care Group of Washington University, a prepaid group practice model. This practice is being developed as a teaching practice to provide a setting for training in general internal medicine, general pediatrics, medical care organization and economics, and for health care research.

Health Care Planning, Ambulatory Services, Washington University Medical Center. The Division conducts studies to provide a factual basis for planning improvements in the use of ambulatory medical facilities of the Center. In this way it is hoped that more effective medical care can be achieved.

Research in Health Care. Studies of several broad areas are conducted by the staff of the Division, including investigations into effects of various methods of practice on medical care costs, factors in the organization of medical care, studies of triage in emergency rooms, sociologic aspects of medical care, and methods of education for comprehensive care.

Medical and Paramedical Education. The Division is responsible for the course Social Aspects of Medicine; a series of seventeen two-hour lecture-discussion periods presented during the first semester of the freshman year. Other educational activities include the collection and cataloguing of literature related to medical care for the library of the Division, the provision of elective courses for medical students, planning for clinical training in comprehensive medical care, plus the integration of training experience in comprehensive care with in-hospital programs in the classical specialties of medicine. The program for training pediatric nurse practitioners (PNP) is described on page 165; the interinstitutional program for physicians assistants is described on page 166.

Director

Gerald T. Perkhoff, M.D., Washington University, 1948. (See Departments of Medicine and of Preventive Medicine and Public Health.)

Associates

Morris Alex, B.S., University of Missouri, 1942; M.D., Washington University, 1943. (See Department of Medicine)

William C. Banton II, M.D., Howard University, 1946; M.P.H., Johns Hopkins University, 1970. (See Department of Preventive Medicine and Public Health.)

Clifford A. Birge, A.B., Amherst College, 1956; M.D., Washington University, 1961. (See Department of Medicine)

Jerome R. Cox, Jr., S.B., Massachusetts Institute of Technology, 1947; S.M., 1949; Sc.D., 1954. (See Biomedical Computer Laboratory and Department of Physiology and Biophysics) (Also School of Engineering and Applied Science)

Bernard T. Garfinkel, M.D., Washington University, 1948. (See Department of Medicine)

Arnold M. Goldman, A.B., Harvard University, 1955; M.D., Washington University, 1959. (See Department of Medicine)

Lawrence I. Kahn, A.B., University of Alabama, 1941; Louisiana State University, 1945. (See Department of Pediatrics. Also Pediatric Nurse Practitioners Program)

Owen S. Kantor, M.D., University of Missouri, 1968. (See Departments of Medicine and of Preventive Medicine and Public Health)

Susan K. Keating, B.S., University of North Carolina School of Nursing, 1965. (See Department of Pediatrics)

M. Anita Mackie, B.S., McGill University, 1952; M.S., Cornell University, 1954; Ph.D., Michigan State University, 1962. (See Department of Preventive Medicine and Public Health)

Laurence E. Maze, M.D., Washington University, 1948. (See Department of Obstetrics and Gynecology)

Robert S. Mendelsohn, B.A., Washington and Lee University, 1950; M.D., Washington University, 1954. (See Department of Medicine)

Paul S. Simons, B.A., University of Texas, 1963; M.D., Washington University, 1967. (See Department of Pediatrics)

James K. Turner, A.B., Washington University, 1949; M.D., 1953. (See Department of Pediatrics)

John D. Vavra, B.A., University of Colorado, 1950; M.D., Washington University, 1954. (See Administration and Departments of Medicine and of Preventive Medicine and Public Health)

M. Frances Watson, B.S., Northeast Missouri State Teachers College, 1932; M.S.W., Washington University, 1949. (See Department of Preventive Medicine and Public Health)

DIVISION OF TUMOR SERVICES

The Division of Tumor Services was organized as a coordinating committee for the Cancer Teaching Program. Inasmuch as cancer, like other subjects in the medical curriculum, is given in an interdepartmental manner, the Tumor Clinic is the principal site on which these Services function. Using the Tumor Clinic facility, an attempt is made to supplement and coordinate problems relating to neoplastic disease as it exists today. In the junior year, time is allotted to students for working in the Tumor Clinic, where they gain firsthand experience with such problems. The Tumor Conference is held each week for members of the junior class, postgraduate students, and visitors, and serves as a forum for demonstrating some of the more complex problems in diagnosis and therapy which arise in patients with malignant disease.

In the senior year, students may elect periods of study which expose them to the theoretical and practical aspects of the epidemiology, diagnosis, treatment, and prognosis of various human neoplasms in man. This program is tailored to the particular interests of each student with the approval of the Executive Committee of the Tumor Services. These oncological electives for seniors may include studies in any of the following fields: Surgical Pathology, Neoplasms in Children, Surgical and Radiation Therapy, Hematologic Neoplastic Disease and Epidemiology of Cancer.

Cancer Coordinator, Director of Division, and Chairman of the Executive Committee
Harvey R. Butcher, Jr.

Executive Committee

Edward H. Reinhard

Internal Medicine

H. Marvin Camel

Obstetrics and Gynecology

Joseph H. Ogura

Otolaryngology

Lauren Ackerman

Pathology

Teresa Vietti

Pediatrics

William E. Powers

Radiology

BEAUMONT-MAY INSTITUTE OF NEUROLOGY

The Beaumont-May Institute of Neurology was established in 1955 by gifts from the Louis D. Beaumont Foundation, Mrs. Charles M. Rice, and Morton J. May. It is the purpose of the Institute to foster basic and clinical research in neurology with special reference to defects in the structure of the nerve cell which occasion important neurological disorders having a high incidence of prolonged disability.

THE IRENE WALTER JOHNSON INSTITUTE OF REHABILITATION

The teaching of rehabilitation is conducted in all four years of the curriculum by the Department of Preventive Medicine and Public Health in collaboration with various specialty services. The Irene Walter Johnson Institute of Rehabilitation is a modern, two-story facility that is air-conditioned and well equipped for the care of disabled patients. Students of medicine, house officers, and students of paramedical services have an opportunity to affiliate with the Institute.

Traineeship Elective. Traineeships in Physical Disability and Rehabilitation of eight weeks' duration may be elected during the interval between the end of the spring semester and beginning of the fall semester by up to five students who have completed the first year of the medical school curriculum. Specific instruction is given by means of informal lectures, demonstrations, and seminars.

Senior Elective. In the six-week elective in physical disability and rehabilitation the student becomes familiar at first hand with the techniques for defining the extent of physical disability and with various approaches to its treatment. Emphasis is placed on methods used in physical, occupational, and speech therapy, and on the specialized contributions to be made by rehabilitation, social work, nursing, and vocational testing and counseling. Opportunity is made available for special emphasis on the rehabilitation of hand injuries and for participating in research activities of the Biomedical Engineering Unit. (Drs. Holloszy, Kopta)

Associate Medical Director

John E. Brooks, M.B., Ch.B., Victoria University of Manchester, 1958. (See Department of Neurology)

Director

Joseph A. Kopta, B.S., University of Oklahoma, 1958; M.D., 1962; M.S., University of Illinois, 1970. (See Departments of Surgery and of Preventive Medicine and Public Health)

Associate Medical Director

John O. Holloszy, M.D., Washington University, 1957. (See Departments of Medicine and of Preventive Medicine and Public Health)

Associate Director for Education and Administration

Lorraine F. Lake, B.S., Washington University, 1950; M.A., 1954; Ph.D., 1962. (See Departments of Anatomy and of Preventive Medicine and Public Health, and Program in Physical Therapy)

Associate Director for Neurological Research

Sven G. Eliasson, Ph.D., University of Lund (Sweden), 1952; M.D., 1954. (See Department of Neurology)

Graduate Programs in the Medical Sciences

Programs of graduate study at the Washington University Medical Center are designed to prepare students for academic and research careers. There are departmental programs in Anatomy, Biological Chemistry, Microbiology, Pathology, Pharmacology, and Physiology and Biophysics, as well as interdepartmental programs in Biomedical Engineering, General Medical Sciences, and Neurobiology.

Admission

Admission may be granted by the Graduate School of Arts and Sciences after recommendation of the department or administrative committee to which application has been made. Applications for admission and financial aid are due no later than Feb-

ruary 15 of the academic year preceding that in which study is to begin. Admission is granted without regard to race, color, national origin, sex, or religious creed, but with regard to ability and the number of openings currently available. In general, a student should have completed at a high scholastic level undergraduate training in biology, chemistry, or physics, and have completed most of the following courses: biology, genetics, chemistry (general, analytical, organic and physical), physics, and calculus. It is possible for the student, in exceptional cases, to fill some lack of basic entrance requirements for the specific program by electing these courses in the beginning year of graduate study. It is strongly recommended that the applicant take the Graduate Record Examination, both the aptitude and advanced portions. Additional information and the application for admission may be obtained by writing directly to

the Office of Graduate Student Affairs, Box 8072, Washington University School of Medicine, 660 S. Euclid Avenue, St. Louis, Missouri 63110.

Registration

The registration dates are listed in the academic calendar at the front of this Bulletin. Instructions and forms for registration will be mailed by the Office of the Registrar to all graduate students who were enrolled in the previous semester or who have been newly admitted. It should be pointed out that the dates for registration and beginning of classes are different at the Medical Center from those on the main campus.

Tuition and Health Fee

For the 1973-74 academic year, the tuition in the Graduate School of Arts and Sciences will be \$1,450 per semester for full-time study. For students enrolled for fewer than twelve units, the rate is \$120 per unit. Graduate students who are enrolled for more than six units per semester in courses at the Medical Center are required to participate in the Medical Center Student Health Service. The health fee is payable each semester at the time of registration.

Financial Assistance

University fellowships, including tuition scholarships and remissions, are available at the levels of \$2,400, Beginning; \$2,600, Intermediate; and \$2,800, Terminal, in all departments and programs. An annual allowance of \$500 per dependent is also provided. The stipends are paid on a twelve-month basis. A student health fee is included.

Inquiries regarding financial aid should be directed to the appropriate department or to

the Graduate Student Affairs Office, Washington University School of Medicine, 660 S. Euclid, St. Louis, Missouri 63110.

DEPARTMENTAL PROGRAMS

Anatomy

Although in the minds of many people anatomy is often equated with the dissection of the human body, in fact most modern departments of anatomy are actively involved in research in several basic areas of biology and in teaching courses such as Cell Biology, Developmental Biology, and Neuroanatomy. With the development of techniques for high resolution electron microscopy and cell fragmentation, for histochemistry and radioautography, the anatomist is now equipped to study the problems of structure at almost every level from the macromolecular to the macroscopic. These

technical developments have occurred at a time when there is a considerable resurgence of interest on the part of biochemists, physiologists, pharmacologists, and microbiologists in the fine structure of cells and tissues.

While the research being carried out in the Department of Anatomy reflects the interest of the faculty, the Department is particularly well staffed and equipped for studies of (1) early mammalian development and placentation; (2) cell growth and differentiation *in vivo* and in tissue culture; and (3) the structure and development of the central nervous system.

The graduate training program is designed to accommodate the differing backgrounds and interests of individual students, but generally includes courses in at least two of the four subjects taught to first-year medical



students. In addition to advanced courses in the Department, courses in such subjects as biochemistry, physiology, and pharmacology are recommended, and these are supplemented by tutorials and seminars in topics as diverse as comparative placentation, genetic expression in eukaryote cells, and neuronal specificity.

Students are expected to be familiar with the foreign literature in their field of research and to demonstrate proficiency in one scientifically relevant foreign language. This may be accomplished by having two years of the language at the college level, taking the Educational Testing Service examination, or by translating a scientific paper, germane to the student's interest, written in the language. For a listing of the faculty and the courses offered see p. 42.

Biological Chemistry

Biochemistry is the application of the knowledge and techniques of chemistry to the study of the nature of living matter. As such, it encompasses all aspects of living organisms which depend in essence upon the varied structure and properties of different molecules and their interactions. Problems in biochemistry may range from such simple interactions as those involved in the hydration of carbon dioxide to give carbonic acid, to the tremendously complex ones involved in the processes of memory or heredity. Those who choose to work in the general area of biochemistry find an almost bewildering array of available problems to which they may devote their lives. No single department could possibly cover all aspects of this science, but the research interests of the faculty reflect a wide range of important biological problems centering

around metabolic pathways and their regulation, protein structure and function, membrane structure and function, and genetic information.

The faculty considers the primary goal of graduate education is to provide students with a core of fundamental knowledge sufficient to make them capable of becoming independent investigators. To this end, the Department places considerable emphasis on (1) research training, which generally begins in the first year; (2) specialized



courses, generally taught on a two-year cycle; (3) formal and informal seminars in which students, postdoctoral fellows, and faculty participate; and (4) a low student-to-faculty ratio, which on the average is no greater than one or two students per staff member.

The student is required to demonstrate competence in one language by passing a reading competence examination administered by the Department. For a description of the courses offered and a listing of the faculty, see p. 50.

Microbiology

Microbial cells and eukaryotic cells in tissue culture offer model systems for examining many of the basic biological phenomena that occur in higher organisms. On this basis, we attempt to understand a variety of problems associated with growth, reproduction, virus formation, and differentiation of normal and malignant cells. Many of these problems are analyzed on the molecular level and deal with the structure, function, and organization of cell components and with the regulation of gene action. Another area of research in the Department is concerned with the molecular and cellular basis of the immune response, e.g., the nature and structure of antibody molecules and the function of their active sites, and the role of immunogens in stimulating cells to differentiate and produce antibody molecules. Research projects related to many of these topics are pursued by staff members and therefore allow students to have a wide range of possibilities from which to choose thesis research programs.

Because of an emphasis in research at the molecular level, the student should have a thorough background in mathematics, phys-

ics, chemistry, and biology. Certain courses, such as physical chemistry, may be elected in the first year of graduate study.

The course program for the Ph.D. degree will be constructed to meet the needs of the individual student based on his particular background and interests. In general, the program will include topics in molecular and cell biology (microbial and cellular genetics, virology, immunology, cell physiology and metabolism); courses in physical and macromolecular chemistry, advanced organic chemistry, and biochemistry; and a research thesis under the supervision of a member of the departmental staff. See p. 70 for further information about the Department, including a list of the faculty and the courses offered.

Pathology

Experimental pathology is concerned with the abnormal responses of biologic systems. Research includes investigations of diseases occurring naturally in man and in other animals, as well as studies of molecular reactions occurring in cells maintained in controlled environments *in vitro*. The focus of experimental pathology is on those areas in which the most detailed and precise knowledge of normal biologic processes exists, since a basic understanding of orthobiologic reactions is necessary before the significance of altered reactions can be evaluated. Research projects involving studies of alterations in intermediary metabolism, structure and function of subcellular organelles, cellular regulatory mechanisms, and tumor immunology are emphasized. Pioneering attempts are also made to investigate the more complex reactions involving associations of cells, organ systems, and whole organisms.

The Department of Pathology offers opportunity for advanced study and research leading to the Ph.D. degree. Graduate courses are designed to give students a broad background in cellular biology. Courses available in the Department are supplemented by courses offered by other departments, including physical chemistry, biochemistry, genetics, computer science, statistics, microbiology, immunology, molecular biology, and other areas of contemporary biology. Students are urged to take a wide selection of background courses in preparation for their laboratory research. In order to maintain the close relationship necessary for good research training, each graduate student works with a staff member in a small research group.

The Department expects its graduate students to be familiar with the foreign literature in their fields of research but does not require that the level of language competence be demonstrated by examination. The faculty and courses offered are listed on p. 92.

Pharmacology

Pharmacology is essentially the study of the mechanism of drug action. It has two basic goals: (a) to provide the medical profession with the knowledge necessary for the effective use of drugs presently available; and (b) to discover the principles of drug action which, in turn, will lead to the design of more effective drugs in the future. The precise definition of what pharmacology is, and particularly what methods it uses, has undergone distinct changes within recent years. In its broadest sense, pharmacology does not restrict itself to the action of drugs in mammals, but examines their effects within the entire phylogenetic

spectrum. In its methodology, pharmacology borrows heavily from biochemistry, physiology, and microbiology and, conversely, contributes much to its sister disciplines. This interdependence of the basic sciences is best illustrated by the principal research interests of the staff.

The Department's program of training in biochemical pharmacology is designed to lead to the Ph.D. degree in about four years. It includes a minimum of 36 credits (usually more) in advanced courses in chemistry, biochemistry, physiology, pharmacology, microbiology and possibly histology, genetics, embryology, neuroanatomy, and pathology. The exact course of study takes into account any previous training or experience and the research interests of the candidate. A small amount of research laboratory experience is introduced early, and the last year and one-half is devoted almost entirely to thesis research. Qualifying examinations are usually taken near the end of the second year or early in the third year. In addition, the ability to read the scientific literature in one appropriate foreign language is required. The Department offers courses in general pharmacology, biochemical pharmacology, and the biochemistry of the central nervous system. A complete listing of courses offered and of the faculty begins on p. 106.

Physiology and Biophysics

The aim of the graduate program in the Department of Physiology and Biophysics is to offer training and experience which will equip candidates for investigative and teaching careers in developing areas of these sciences.

Biophysics concerns the role of physical factors in biological processes and the use of

physical methods in the study of biological problems. Physiology is concerned with regulatory and integrative aspects of biochemical and biophysical processes at both a cellular and systemic level.

Physiological problems currently under study in the Department include membrane transport, neurophysiology, muscle contraction, the physiological basis of sensation, the control of cellular biochemical processes by regulatory agents such as hormones, circulation and cardiac muscle, and respiration.

The aspects of biophysics of particular interest to this Department are macromolecular structure, X-ray crystallography, nerve and muscle membrane, and muscular contraction. The Department has close associations with the nearby Computer Systems and Biomedical Computer Laboratories, and a number of collaborative studies are under way.

In order to approach problems in physiology and biophysics at a basic level, a strong background in mathematics, physics, and chemistry is necessary, along with a thorough foundation in biology, biochemistry, and the morphology of cells and tissues. Students will be expected to follow a program of study which will provide this foundation, and then they will be expected to concentrate in some area of special interest. A student will be expected to bring to satisfactory completion research which represents an original and significant contribution to knowledge.

A reading knowledge of one foreign language is required.

For a further description of the Department, its faculty, and the graduate courses offered, see p. 109.

INTERDEPARTMENTAL PROGRAMS

Biomedical Engineering

Faculty

Associate Professor Hochmuth, Chairman; Professors Boyarsky, Cowan, Cox, Molnar, Pfeiffer, Sparks, Sutura, Ter-Pogossian, Vagelos, Wann, Wette; Associate Professors Labay, Pickard, Walkup; Assistant Professors Arthur, R. Clark, L. Thomas, S. Weinberg; Instructors Bomze, Larson; Research Associate Mason.

This course of graduate study is designed to provide education and training for students wishing to apply principles of modern engineering and mathematics to theoretical and practical problems in biology and medicine. Students and faculty of both the School of Engineering and Applied Science and the School of Medicine participate in the Program.

Every student seeking an advanced degree in engineering must be admitted to one of the participating departments of the Sever Institute of Technology, the graduate division of the School of Engineering and Applied Science. The Program permits the student to earn both the M.D. and the M.S. or D.Sc. degrees in conjunction with other programs in the School of Medicine. Students not candidates for a degree are welcome to take courses as electives.

Graduate study plans are tailored to the individual's needs and interests, and provide essential background in the related areas of life and medical sciences. Students with diverse undergraduate backgrounds may be admitted provided they have adequate preparation and experience in mathematics and the physical sciences. Areas of

specialization include sensory communications, electrocardiography, flow and diffusion in biological systems, electrobiology, technology in health care, biomedical statistics, modeling biological systems, engineering of artificial organs, urodynamics, and applications of advanced computer techniques to biology and medicine. Research facilities available to the Program are located in the School of Engineering and Applied Science, the School of Medicine, and the Washington University Computer Laboratories. The faculty includes representatives from the Biomedical Computer Laboratory, the departments of Biological Chemistry, Physiology and Biophysics, Preventive Medicine and Public Health, Radiology, Surgery, and Anatomy in the School of Medicine; and the departments of Applied Mathematics and Computer Science, Chemical Engineering, Electrical Engineering, and Mechanical En-

gineering in the School of Engineering and Applied Science.

Complete course listings and information about application and degree requirements may be found in the Bulletin of the School of Engineering and Applied Science.

BMed 600. *Research for Doctoral Dissertation.*

BMed 644. *Surgical Techniques for Biomedical Experimentation.* A course of instruction in surgical techniques necessary for basic experimental applications. Sterile-chronic surgery, implant techniques for telemetry and monitoring agents. The humane care, handling, and housing of animals, choice and induction of anesthesia. Techniques of ligation, suturing, and cannulation. Use of respirators, gas analyzers, and other associated instruments. Permission of



instructor required. One class hour and four laboratory hours a week. Credit 3 units.

BMed 660. *Biomedical Applications of Small Digital Computers.* Introduction to the use of digital computers in the laboratory. Considerations in the choice of computer equipment and algorithms for the solution of laboratory and clinical problems. Examples of applications in data gathering and algorithms for the solution of laboratory and clinical problems. Examples of applications in data gathering and processing control of experiments, modeling, and simulation. Prerequisite, Electrical Engineering 360, Applied Mathematics and Computer Science 132, or permission of instructor. Credit 3 units.

BMed 693. *Special Topics in Biomedical Engineering: Biological Mass and Momentum Transfer.* Principles of viscous incom-

pressible flow and diffusion and mass transfer in flowing fluids. Application of these principles to the analysis of physiological problems and to the design and operation of artificial organ devices. Discussion of convective diffusion in blood and flow in peristaltic pumps, arteries, and capillaries. Credit 3 units.

Other Biomedical Engineering course offerings:

BMed 545. *Hospital Electrical Systems and Instrumentation*

BMed 549. *Engineering Aspects of Health Care Delivery*

BMed 555. *Methods of Biomedical Statistics*

BMed 573. *Electrobiology*

BMed 576. *Sensory Communications*



For additional related courses, see Biomedical Computer Laboratory in this Bulletin and the Bulletin of the School of Engineering and Applied Science.

General Medical Sciences

The graduate program in General Medical Sciences is an interdepartmental program leading to a Ph.D. degree in one of the following participating departments: Anatomy, Biological Chemistry, Microbiology, Pathology, Pharmacology, and Physiology and Biophysics.

The program is designed to satisfy two needs in graduate training in the area of medical sciences: (1) to provide for broadly based interdisciplinary approaches to research in medical sciences that are not directed toward a particular discipline or system, and (2) to provide a mechanism whereby qualified students who have not chosen an area of specialization can find their way into research in medical science.

The course work in the first two years will be selected on the basis of the background and general interests of each student from the courses offered by the participating departments. In addition, attendance at a seminar on current research in the medical sciences will be required. During the second year after the preliminary examination has been completed, the student will devote most of his time to his research, which will be under the direction of one or more of the basic science departments at the School of Medicine.

Neurobiology

Administrative Committee

Professor A. I. Cohen, Chairman; Professor Eliasson, Executive Secretary; Professors

R. Bunge, Cowan, J. Cox, H. Davis, Eldredge, Enoch, S. Goldring, Hamburger, Hunt, Landau, Levi-Montalcini, O. Lowry, McDougal, Molnar, O'Leary, Pfeiffer, E. Robins, Sandel, Stern, Stewart, R. Thalmann, Torack; Associate Professors Bradshaw, Prensky, Rovainen, Schlaepfer, W. Sherman.

Interested students should consult the Executive Secretary, Committee on Neurobiology, Washington University School of Medicine.

The graduate program in Neurobiology leads to the degree of Doctor of Philosophy. Participating are the departments of Anatomy, Biochemistry, Biology, Neurology, Ophthalmology, Otolaryngology, Pathology, Physiology and Biophysics, Psychiatry, Psychology, and Surgery; the School of Engineering and Applied Science; the Washington University Computer Laboratories; and Central Institute for the Deaf.

The program of study is adjusted to the particular aims of individual students, and includes investigations into the organization and function of the nervous system, such as mechanisms of sensing the external and internal environments; the conversion of adequate stimuli into signals and the transmission of coded information; information storage and retrieval; evaluation of information and initiation of responses; gross anatomy and microstructure; development, organization, and regeneration; biochemical features of structure, action, and control in neural tissues and systems.

Because of the diversity of the study and research programs, students of such varied fields as biology, chemistry, physics, psychology, mathematics, and engineering, and

graduates of schools of medicine, veterinary medicine, and dentistry may be admitted.

During the first two years, most Neurobiology students will take courses in biochemistry (Biological Chemistry 503), microscopic anatomy (Anatomy 503), neural sciences (Anatomy 504 and Physiology 504), and in one of the following: physiology, pathology, pharmacology, biology, microbiology, or in a behavioral science. A list of some other acceptable courses is maintained by the Executive Secretary. In ad-

dition, during the second and third years, students are required to take a minimum of three seminar courses to be selected from three different areas of the following five areas: neuroanatomy, neurophysiology, neurochemistry and neuropharmacology, experimental psychology, and computer techniques relevant to neural phenomena. For most students there will be a major in one discipline of Neurobiology and a minor in another. Details of additional course work and training are left to the student's advisory committee.



Allied Health Professions

Programs are conducted by the School in Health Care Administration, Occupational Therapy, Physical Therapy, Radiologic Technology, and for Pediatric Nurse Practitioners. All courses are approved by the American Medical Association or other certifying agencies, and graduates qualify for certifying examinations. For further information write to the director or educational director listed under the particular program, 660 South Euclid Avenue, St. Louis, Missouri 63110.

GRADUATE PROGRAM IN HEALTH CARE ADMINISTRATION

The Setting

The Health Care Administration Program is designed to provide a total concept in education through research, learning, and clinical experience. The faculty and staff are committed to academic and professional development of every student, and strives continually to motivate, encourage, and stimulate, providing guidance on an individual student basis. The Program offers the opportunity and resources for each student to exercise, test, and stretch his ability as a mature individual.

The art of top administration/management is solving problems through motivating people. Considerable expertise and knowledge are required to accomplish this difficult task. Today's health care executive must have competence in many disciplines to understand the complexities of the internal workings and relationships of the organization that he is leading, as well as the external environment in which he must operate diplomatically.



Sequence of Study

In redesigning the sequence of study, it was obvious that the curriculum must provide the M.H.A. graduate with the basic theory and necessary tools in his didactic work to equip him to function in and operate the health care system of the future. Exposure to courses such as finance, accounting, economics, statistics, research methodology, quantitative methods, management systems, and health law are now essential. But, most importantly, the new generation of health care executives must develop inquisitive minds, have a broad knowledge of the political process, and must be able to anticipate, recognize, and deal effectively with social issues that affect their organization and community.

Due to this increased academic content and the need for more elective management courses, the didactic requirements for the M.H.A. degree have been changed from three to four semesters. The total period of time involved for the M.H.A. degree, including the administrative residency, is 24 months. As of 1973, new classes matriculate in June rather than in September. The time sequence is as follows: First Semester (Summer), Second Semester (Fall), Third Semester (Spring), and Fourth Semester (Summer).

A nine-month administrative residency is required following the completion of the course work of 60 credit hours. At the conclusion of the residency in a hospital or health agency for the period September 1 through May 31, the M.H.A. degree is conferred.

The major thrust for the changes was to make time available for additional courses for students to pursue, thus providing an opportunity for them to concentrate 15 of the 60 credit hours in an area of their choice (health planning, long-term care, financial management, organizational behavior, operations research, comparative health care systems, etc.).

Options: Thesis, Independent Study, Research Project

The student may choose one of the following options in partial fulfillment of the requirements for the M.H.A. degree.

1. *Thesis.* Demonstration of competence through original investigation of topic approved by the faculty thesis committee. Six credit hours.
2. *Independent study.* A project directed by an on-campus faculty member, with a

major paper being required. Three credit hours.

3. *Applied research project.* Topic approved by on-campus faculty in cooperation with the preceptor, if the project is accomplished during the administrative residency. Three credit hours.

Off-campus Administrative Residency (9 months)

The nine-month residency is an integral part of the graduate program's educational sequence and is required regardless of the student's previous experience. The residency assignment, determined by the faculty, is served in one of Washington University's affiliated hospitals, as recommended by the faculty and approved by the Director. The purpose of the residency, for which graded academic credit is given, is to provide the graduate student with an opportunity to observe in the field those concepts and principles learned during the on-campus academic exposure. The requirement is completed under the direction of a well-qualified and experienced administrator who is given an annual faculty appointment at Washington University School of Medicine.

The on-campus faculty maintains close communication with the administrative resident and the off-campus faculty. The preceptor must file an educational plan that outlines the administrative resident's activities for the coming year. The preceptor will also send progress evaluation reports to the Director of the Program and assume responsibility for grading the student during the residency period.

An on-campus faculty member visits each residency site to meet with the adjunct faculty member (preceptor) for the purpose

of examining the resident to determine his worthiness for conferment of the M.H.A. degree. The examination consists of an oral review of didactic and clinical material learned.

Applicants are required to have a bachelor's degree from an accredited university or college acceptable to Washington University. The aptitude test of the Graduate Record Examination is required of all applicants.

Tuition: Hospital Administration
Per semester (three semesters) . . . \$1,375

Tuition: Comprehensive Health Planning
Per semester (four semesters) . . . 1,375

Books and supplies (per semester) 50-75

Application fee (nonrefundable) . . . 15



Assistant Professor and Director

James O. Hepner, B.A., University of Iowa, 1955; M.H.A., Washington University, 1959; Ph.D., University of Iowa, 1964.

Assistant Professor and Associate Director

Donald J. Horsh, B.S.B.A., University of Nebraska, 1941; M.H.A., Washington University, 1951; J.D., St. Louis University, 1953.

Professor Emeritus

Frank R. Bradley, M.D., Washington University, 1928; LL.D., Central College, 1943.

Assistant Professor

David A. Gee, B.A., DePauw University, 1949; M.H.A., Washington University, 1951.

Assistant Professor (Adjunct)

Robert E. Frank, B.S., St. Louis University, 1950; M.A., 1962.

Instructors

James H. Garrett, B.A., Texas Christian University, 1966; M.A., 1969; M.H.A., Washington University, 1971.

Beverly B. Monical, B.S., Washington University, 1960; M.H.A., 1972. (See Program in Physical Therapy)

Instructors (Adjunct)

Douglas A. Bean

Ted Bowen, B.S., Austin College, 1941; M.H.A., Washington University, 1948.

James A. Canedy, B.A., Hastings College, 1950; M.H.A., Washington University, 1952.

Dan L. Dearen, B.S., Texas Technological University, 1958; M.A., Arizona State University, 1962; Ed.D., 1968.

Paul A. Donnelly, B.A., University of New Hampshire, 1960; M.P.H., Cornell University, 1962.

Richard P. Ellerbrake, B.A., Elmhurst College, 1955; B.D., Eden Theological Seminary, 1958; M.H.A., Washington University, 1964.

Thomas W. Fourqurean, B.B.A., Texas College of Arts and Industries, 1939; M.B.A., University of Chicago, 1949.

Frank S. Groner, A.B., Baylor University, 1934; LL.D., East Texas Baptist College, 1946; Union University (Tennessee), 1952; Baylor University, 1969.

James D. Harvey, B.A., University of South Dakota, 1950; M.H.A., University of Minnesota, 1952.

Thomas L. Hawkins, Jr., M.D., Albany Medical College of Union University, 1953.

Daniel M. Herrin, B.S., University of Maryland, 1960.

David H. Hitt, B.S., University of Alabama, 1949; University of Minnesota, 1952.

Harry C. Mobley, B.S., Fairmont College, 1958; M.H.A., Washington University, 1962.

Stephen M. Morris, B.B.A., Southwestern University, 1952; M.H.A., Washington University, 1954.

Boone Powell, LL.D., Baylor University, 1958.

Carl C. Rasche, B.A., Elmhurst College, 1939; L.H.D., 1960; B.D., Eden Theological Seminary, 1943.

Mary Roch Rocklage, B.S., St. Xavier College, 1961; M.H.A., St. Louis University, 1963.

Robert F. Scates, B.A., Baylor University, 1939.

Glenn N. Scott, B.A., Oklahoma Baptist University, 1956; M.H.A., Washington University, 1962.

Gerald C. Stewart, B.Comm., University of Saskatchewan, 1948; Diploma in Hospital Administration, University of Toronto, 1949.

Gail L. Warden, A.B., Dartmouth College, 1960; M.H.D., University of Michigan, 1962.

Neil C. Wortley, B.S., Southwest Missouri State College, 1950; M.H.A., Washington University, 1952.

Lecturers

Rodney M. Coe, B.S., Iowa State University, 1955; M.A., Southern Illinois University, 1959; Ph.D., Washington University, 1962.

James D. Collom, B.S., Ball State Teachers College, 1954; M.H.A., Washington University, 1961; Ph.D., University of Iowa, 1971.

Harry E. Davis, Jr., B.S., St. Bonaventure University, 1950; M.H.A., Washington University, 1961.

Paul R. Donnelly, B.M.Ed., American Conservatory of Music, 1951; M.S., Northwestern University, 1957.

Gerald Gutenschwager, B.S., Eastern Michigan University, 1954; M.A., University of Chicago, 1957; Ph.D., University of North Carolina, 1969.

Neil B. Hadley, B.A., Iowa State Teachers College, 1949; M.H.A., Baylor University, 1958; M.S., Arizona State University, 1962.

Donna M. Hepner, A.B., Webster College, 1966.

Raymond L. Hilgert, B.A., Westminster College, 1952; M.S.B.A., Washington University, 1961; D.B.A., 1963.

Harold Hinderer, B.A., College of St. Thomas, 1952.

William A. Kamman, B.S.I.E., Washington University, 1958.

Merlin E. Lickhalter, B.A., Massachusetts Institute of Technology, 1957.

Phillip T. May, Jr., Ph.D., C.P.A., University of Wisconsin, 1966.

Linn B. Perkins, B.A., Amherst College, 1949; M.H.A., Washington University, 1951.

James W. Polkinghorn, B.A., University of Kansas, 1937.

Donald J. Ruffing

Barbara Vogel

PROGRAM IN NURSE ANESTHESIA

The Barnes Hospital School of Anesthesia, established in 1929, offers an accredited two-year program to graduate nurses. Applicants for admission must be registered nurses from an accredited nursing school and should rank in the upper one-third of their class. Personal and professional qualifications of the applicant must be of the highest quality.

The aim of this program is to develop well-trained nurses in the specialty of anesthesia, which is an essential service to the care of the patient before, during, and after surgery.

Approximately 400 didactic hours are presented to the students in anatomy, physiology, chemistry, physics, anesthetic agents, and all subjects related to the field of anesthesia. Approximately 1,000 anesthetics are administered by each student under supervision. Clinical experience is received in all types of operating procedures and all anesthetic agents, using all types of anesthetic techniques. Students also receive experience in pre- and post-anesthesia care, inhalation therapy, respiratory and cardiac intensive care units.

Upon graduation from this program, the student is qualified to sit for the accredited examination of the American Association of Nurse Anesthetists, which, when completed, confers the title of Certified Registered Nurse Anesthetist (C.R.N.A.).

Tuition (for entire 24-month program) \$200

Stipend and maintenance

First year (per month) \$325

Second year (per month) \$385

Instructor and Director

Dean E. Hayden, R.N., C.R.N.A., Barnes Hospital School of Anesthesia, 1940.

Instructor and Educational Director

Louise S. Grove, R.N., C.R.N.A., Barnes Hospital School of Anesthesia, 1960.

Lecturers

Leslie Alikhan, R.N., C.R.N.A.
 Robert Ayres, R.N., C.R.N.A.
 Linda Brennan, R.N., C.R.N.A.
 June Crafton, R.N., C.R.N.A.
 James D. Cuddeford, R.N., C.R.N.A.
 Margaret Deckard, R.N., C.R.N.A.
 Diane Edwards, R.N., C.R.N.A.
 Norman Hampton, R.N., C.R.N.A.
 Florence Hess, R.N., C.R.N.A.
 Matilda Katterhenry, R.N., C.R.N.A.
 Robert H. McCoy, R.N., C.R.N.A.
 Helen Ogle, R.N., C.R.N.A.
 Paula Pepper, R.N., C.R.N.A.
 Germaine Rheume, R.N., C.R.N.A.
 Betty Strzelec, R.N., C.R.N.A.
 LaVerne J. Will, R.N., C.R.N.A.
 Carmen Wright, R.N., C.R.N.A.

PROGRAM FOR PEDIATRIC NURSE PRACTITIONERS

The School of Medicine, through the Department of Pediatrics and the Division of Health Care Research, has established a program for training Pediatric Nurse Practitioners. It encompasses a period of eight months beginning in September of each year. This Program was developed to help meet the challenge of expanded health services needed by the pediatric community and to provide nurses with an opportunity to extend the range and depth of their skills



The curriculum is divided into a four-month didactic period, followed by a four-month practicum. The practicum may be obtained through the facilities of the program or, by special arrangement, at the site of future employment for those nurses who are sponsored by an employer or agency guaranteeing an appropriate position upon the completion of training. The instruction is centered at the St. Louis Children's Hospital and the Division of Health Care Research. Other resources of the Medical Center, the city, and the offices of private pediatricians are utilized. The major portion of the instruction is provided by the Department of Pediatrics.

The Pediatric Nurse Practitioner (PNP) is a registered nurse whose special training enables her to play a larger role in providing pediatric services. She obtains histories, performs physical examinations, and appraises physical, psychological, and intellectual growth and development. She is competent to counsel families in matters concerning nutrition, accident prevention, and child rearing. With the physician she participates in the management of acute and chronic illnesses.

Applicants must be registered nurses. A B.S. degree in nursing from an accredited program and experience in pediatrics are preferred but not required. On completion of training, the PNP is qualified to serve anywhere in the country where pediatric services are offered. The Program complies with the guidelines for such training as proposed by the American Academy of Pediatrics.

Tuition (full program)\$1,760
Tuition (practicum elsewhere) 1,260

ST. LOUIS INTERINSTITUTIONAL PHYSICIAN'S ASSISTANT TRAINING PROGRAM

Washington University participates in the St. Louis Interinstitutional Program for Physician's Assistants conducted by St. Louis University School of Nursing and Allied Health Professions. This 24-month program is designed to train individuals to collect historical and physical data and to perform various diagnostic and therapeutic procedures. The goal is to prepare well trained individuals to assist the physician to extend the effectiveness of his medical practice. For application forms and further information, contact:

Associate Director
Physician's Assistant Program
1504 South Grand Boulevard
St. Louis, Missouri 63104

or

Coordinator for Allied Health Training
Veterans Administration Hospital
St. Louis, Missouri 63125

PROGRAM IN OCCUPATIONAL THERAPY

Applicants for admission must present sixty semester hours of college credit, including a specified number of units in English, biology, physical science, psychology, and social science.

Upon completion of three academic semesters at the School of Medicine and seven months' supervised clinical practice with both children and adults, the degree of Bachelor of Science in Occupational Therapy is conferred. In the academic and clinical programs, emphasis is placed on understanding the patient's physical and psychological problems resulting from developmental deficits, disease, and trauma. Therapeutic techniques of creative, manual, and prevocational activities are correlated therapeutically to provide treatment.

Occupational therapy, functioning with various medical and social resources of the community, broadens the concepts of patient rehabilitation and is stressed as an important part of the course.

The curriculum includes sciences such as anatomy, physiology, neurophysiology, and neuroanatomy; clinical subjects such as general medicine, neurology, orthopedics, and psychiatry; interpretation of principles and practices of occupational therapy; and technical instruction in manual, creative, and prevocational activities. The period of supervised clinical application is spent in approved affiliation centers.

Tuition (three semesters),
per semester\$1,375

Tuition (seven-month
clinical period) 900

*Assistant Professor and Elias Michael
Director*

Martha E. Matthews, A.B., Winthrop College,
1933.

Assistant Professor and Associate Director

Elizabeth H. Withers, B.S., Memphis State
University, 1957; M.A., 1959.

Assistant Professor

Garth D. Tubbs, B.S., Wisconsin State Col-
lege, 1953.

Instructors (Clinical)

Mary Beth Adelman
Julia M. Anstey
Elizabeth A. Boles
Theresa C. Burmeister
Marion A. Calph
Barbara Ditmanson
Irene G. Doell
Virginia H. Drewing
Barbara N. Goldsmith
LaVerne W. Grady
Ruth Grummon
Patricia S. Hansen
Doris M. Hartman
Phyllis M. Kramer
Sandra S. Leimer
Nancy S. Mashak
Margaret McMullen
Sarah A. Meany
Juanita Michel-Trapaga
Mary K. Murphy
Virginia E. Niles
Sonja L. Parr
Janice M. Schultz
Ruth K. Schwartz



Joanne Silhavy
Dixie H. Sleight
Mary Brendon Smith
Marlene R. Swan
Marion S. Warack
Janet E. Williamson
Jacqueline V. Zschokke

PROGRAM IN PHYSICAL THERAPY

The program of instruction in physical therapy in the School of Medicine consists of the junior and senior years of a four-year college curriculum leading to the degree of Bachelor of Science in Physical Therapy.

Students entering this program must have satisfactorily completed sixty semester hours in an accredited college or university. Required are courses in English, psychology, biology, physics, chemistry, and social sciences.

The program includes courses in the basic medical sciences, medical and surgical lectures as applied to the practice of physical

therapy, theory and application of physical therapy procedures, and a minimum of 800 hours of clinical experience.

The aim of the program is the development of competent physical therapists whose broad cultural backgrounds and thorough professional training prepare them to accept appropriate responsibilities in the comprehensive care program of modern medicine.

Tuition (three semesters),
per semester\$1,375

Tuition, final clinical semester 900

Further information may be secured by direct correspondence with the Program in Physical Therapy, Box 8083, 660 South Euclid Avenue, St. Louis, Missouri 63110.



Assistant Professor and Director

Beatrice F. Schulz, B.S., Washington University, 1949; M.A., 1955.

Assistant Professor and Assistant Director

D. LaVonne Jaeger, B.S., University of Minnesota, 1951; M.A., Washington University, 1966.

Assistant Professors

Isabelle M. Bohman, B.S., Skidmore College, 1951; M.S., University of Illinois, 1954.

Lorraine F. Lake, B.S., Washington University, 1950; M.A., 1954; Ph.D., 1962. (See Departments of Anatomy and of Preventive Medicine and Public Health and Irene Walter Johnson Institute of Rehabilitation)

Instructor

Robert J. Hickock, B.S., Washington University, 1953; M.A., 1971.

Lecturers

Lynn Gillula, B.S., Washington University, 1968. (See Department of Preventive Medicine and Public Health)

Beverly B. Monical, B.S., Washington University, 1960; M.H.A., 1972. (See Health Care Administration)

Patricia R. Pickett, B.S.N., Western Reserve University, 1959. (See Department of Preventive Medicine and Public Health)

PROGRAMS IN RADIOLOGIC TECHNOLOGY

The Department of Radiology, which has its headquarters in the Edward Mallinckrodt Institute of Radiology, offers a basic course in X-ray technology and two one-year post-graduate courses. Each course leads to a certificate awarded by the Washington University School of Medicine, Department of Radiology.

X-ray Technology. This two-year course is approved by the A.M.A., A.R.R.T., and V.A., and covers by lectures and group discussion the following subjects: anatomy and physiology, radiographic technique, radiation physics, darkroom processing procedures, nursing procedures, administration, radiation therapy, professional ethics, medical terminology, medical isotopes, survey of medical and surgical diseases, and radiographic positioning. Course work totals 500 hours.

During the first six months, a student is on probation. Upon satisfactory completion of this work, he will be paid a monthly stipend of \$50 for the next six months. This stipend increases to \$75 for the third six months and \$100 for the last six months. During the twenty-four months, the student is assigned tours of duty in various diagnostic and therapeutic areas for practical experience, amounting to a total of 30 contact hours a week.

Candidates for admission must be graduates of an accredited secondary school and should rank in the upper third of their class. Special consideration is given to graduates of schools of nursing that are recognized by the State Board of Nurse Examiners and to students who have passed

a college entrance examination. A one-year postgraduate course is offered in the fields of therapy and nuclear medicine.

Nuclear Medicine Technology. This course covers twelve consecutive months divided between didactic course material (319 hours) and practical experience. The student receives a monthly stipend of \$300.

Candidates for admission must be registered technicians (ARRT) or registered nurses with two years of college or with a baccalaureate degree. Medical technologists or persons having a B.S. degree with a major in biology, chemistry, or physics may also be considered if they have completed basic

courses in human anatomy and physiology of at least 60 class hours.

Radiation Therapy Technology. This course covers twelve consecutive months divided between didactic course material (300 hours) and practical experience. The student receives a monthly stipend of \$350. Candidates for admission must be registered X-ray technologists (ARRT) or registered nurses.

Lecturer and Educational Director

Armand Diaz, R.N. and R.T., Havana University School of Medicine, 1948.



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Robert Lee, M.Ed.

*Coordinator for Minority Student
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172 The School of Medicine

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Faculty Emeritus and Consultant
to the Dean*

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Business Manager

Gerald G. Morris, M.D.
*Physician in Charge of Student Health
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Librarian

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*Administrative Secretary to the
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Assistant Registrar

Daniel Gashler, B.S.
*Director of Alumni Affairs and of
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Six institutions comprise the Washington University Medical Center. They are: Barnard Free Skin and Cancer Hospital, Barnes Hospital, Central Institute for the Deaf, Jewish Hospital of St. Louis, St. Louis Children's Hospital, and Washington University. Members of the Board are elected yearly by the separate institutions.

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The Faculty Council consists of all full-time members of the faculty with the rank of professor, associate professor, assistant professor, and those instructors who have been on the faculty for at least three years. The officers and executive committee are:

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Preclinical Representative to the Executive Committee of the Faculty Council
Craig M. Jackson
Preclinical Representative to the Executive Faculty
Virginia Weldon
Clinical Representative to the Executive Faculty
Robert A. Woodruff
Clinical Representative to the Executive Committee of the Faculty Council
Sondra Schlesinger
Representative to the Senate Council of Washington University
Joe W. Grisham
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Gordon Philpott

¹ Part-time faculty representative to the Executive Faculty during 1973-74.

² Representing the Faculty Council during 1973-74.

³ Honorary member.

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⁴ The Dean is *ex officio* a member of all standing committees.

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Harvey Butcher

Edward T. Foote

David Goldring

Lucy King

Eugene N. Mitchell

Stanford Wessler



Register of Students

DOCTOR OF MEDICINE DEGREE

Fourth-Year Class 1972-73 Internship 1973-74

Aleck, Kyriekos Anthony, B.A., Harvard College, '69; B.M.S., Dartmouth Medical School, '71—Los Angeles County Harbor General Hospital, Torrance, California

Anderson, Lynn Ellen, B.S., Muhlenberg College, '70—St. Louis Children's Hospital, St. Louis, Missouri

Ayer, Patrick Craig, B.A., University of Notre Dame, '69—St. Joseph's Hospital and Medical Center, Phoenix, Arizona

Barnes, William Whitley III, A.B., Washington University, '69—St. Louis Children's Hospital, St. Louis, Missouri

Baron, Roy Clifford, B.S., University of Wisconsin, '68—Good Samaritan Hospital and Medical Center, Portland, Oregon

Beall, Gregory Duncan, B.A., Johns Hopkins University, '69—Barnes Hospital, St. Louis, Missouri

Birkenmeier, Edward Henry II, A.B., Washington University, '69—Jewish Hospital, St. Louis, Missouri

Black, John Scott, B.A., University of California (San Diego), '69—North Carolina Memorial Hospital, Chapel Hill, North Carolina

Blumberg, Lesley Zlotta, B.A., University of California, Riverside, '69—Cedars-Sinai Medical Center, Los Angeles, California

Blumhagen, Joel Dean, A.B., Stanford University, '69—University of Colorado Affiliated Hospitals, Denver, Colorado

Boyd, James Clark, B.S., University of Colorado, '69—Barnes Hospital, St. Louis, Missouri

Bussmann, Donald William, Jr., B.A., College of the Holy Cross, '67—Jewish Hospital, St. Louis, Missouri

Bussmann, Yvonne Classen, B.A., Tabor College, '69—St. Louis Children's Hospital, St. Louis, Missouri

Caplan, William Mark, B.S., University of Wisconsin, '69—Kaiser Foundation, San Francisco, California

Carlson, David John, B.A., Wabash College, '69—Indiana University Medical Center, Indianapolis, Indiana

Collins, Robert Leo, B.A., College of the Holy Cross, '69—New England Medical Center Hospitals, Boston, Massachusetts

Condit, John Michael, B.A., University of Arkansas, '69—University of Minnesota Hospitals, Minneapolis, Minnesota

Cooper, Byron Stanley, B.A., Johns Hopkins University, '69—Bellevue Hospital Center, N.Y.U., New York, New York

Cramer, Stewart Frederick, A.B., Cornell University, '69—Barnes Hospital, St. Louis, Missouri

DeLozier, Howard Luther, B.S., Juniata College, '69—Syracuse Medical Center, S.U.N.Y., Syracuse, New York

Denes, Bela Stephen, A.B., Washington University, '69—Barnes Hospital, St. Louis, Missouri

Duff, William Michael, B.A., Westminster College, '67; B.A. (Oxon.), Oxford University, '70—University of Utah Affiliated Hospitals, Salt Lake City, Utah

Earl, Arthur David, B.S., University of Idaho, '69—University of Utah Affiliated Hospitals, Salt Lake City, Utah

Farber, Barry Scott, Texas A. and M. University—University of Kentucky Medical Center, Lexington, Kentucky

Fazzio, Frank James, Jr., Marquette University—University of Utah Affiliated Hospitals, Salt Lake City, Utah

Finkel, Michael Francis, A.B., Washington University, '69—Presbyterian St. Lukes Hospital, Chicago, Illinois

Fleckman, Philip Howard, B.A., University of Texas, '68—Barnes Hospital, St. Louis, Missouri

Fuller, David Lee, B.S., University of Notre Dame, '68—Duke Medical Center, Durham, North Carolina



Glogovac, S. Vic, A.B., Washington University, '69—Barnes Hospital, St. Louis, Missouri

Guletz, John Dennis, B.A., University of Notre Dame, '69—University Hospitals, Madison, Wisconsin

Hill, Edward Feldin, B.S., U.S. Military Academy, '63—University of Oregon Hospitals, Portland, Oregon

Hirsch, John David, A.B., Case-Western Reserve University, '70—Jewish Hospital, St. Louis, Missouri

Holland, Edward Irving, B.S., University of Chicago, '69—St. Louis Children's Hospital, St. Louis, Missouri

Hooper, David Crittenden, B.A., University of Texas, '69—Massachusetts General Hospital, Boston, Massachusetts

Hosler, Mark Wayne, A.B., University of Missouri (Columbia), '69—Barnes Hospital, St. Louis, Missouri

Huddleston, Howard Lee, B.S., Texas A. and M. University, '69—St. John's Mercy Hospital, St. Louis, Missouri

Jacobi, Mark David, B.S., University of Michigan, '69—St. Louis Children's Hospital, St. Louis, Missouri

Jacobs, Arthur Elliott, B.A., University of Kentucky, '69—Presbyterian St. Luke's Hospital, Chicago, Illinois

Jenkins, Mark Schering, B.A., University of Texas, '69—Baylor College Affiliated Hospitals, Houston, Texas

Kaplan, David, A.B., Case-Western Reserve University, '69—Geisinger Medical Center, Danville, Pennsylvania

Karin, Daniel S., B.S., Tulane University, '69—St. John's Mercy Hospital, St. Louis, Missouri

Karl, Robert Harry, B.A., Northwestern University, '69—University of Miami, Jackson Memorial Hospital, Miami, Florida

Kassens, Catherine Healy, A.B., Vassar College, '69; B.M.S., Dartmouth Medical School, '71—Jewish Hospital, St. Louis, Missouri

Kerns, Gale Gordon, University of Montana—University of Oregon Hospitals, Portland, Oregon

Knowlton, Edward Wells, Michigan State University—Henry Ford Hospital, Detroit, Michigan

Knudson, Donald Henry, B.A., Iowa State University, '69—University of Missouri Medical Center, Columbia, Missouri

Kohn, Alan Norman, B.S., Cornell University, '65; M.S., '67; M.M.S., Rutgers Medical School, '71—St. John's Mercy Hospital, St. Louis, Missouri

Koskella, Kenneth Ray, B.S., University of Idaho, '69—Naval Hospital, Oakland, California

Krusack, Louisa May, B.S., University of Illinois, '69—Evanston Hospital, Chicago, Illinois

Lee, King Tak, B.S., Chung Chi College, '68—Jewish Hospital, St. Louis, Missouri

Levine, Marc Albert, B.A., Rice University, '69—Stanford University Hospital, Stanford, California

Lipson, Ace, B.A., New York University, '69—George Washington University Hospital, Washington, D.C.

Mandell, Barbara Cooper, A.B., Washington University, '69—Muhlenberg Hospital, Plainfield, New Jersey

Martin, Samuel Kofelanjuma, B.A., Reed College, '72—Barnes Hospital, St. Louis, Missouri

McCarty, Michael Allan, A.B., Washington University, '69—Jewish Hospital, St. Louis, Missouri

Michael, John Mark, B.A., University of Kansas, '69—Barnes Hospital, St. Louis, Missouri

Milder, Barry David, B.S., Massachusetts Institute of Technology, '69—Baylor College Affiliated Hospitals, Houston, Texas

Miller, Douglas Parker, B.A., University of California (San Diego), '69—North Carolina Baptist Hospital, Winston-Salem, North Carolina

Miller, Jeffrie Davis III, University of Missouri, St. Louis—Martin Luther King, Jr., General Hospital, Los Angeles, California

Minkes, Mark Stanley, A.B., Washington University, '70—Barnes Hospital, St. Louis, Missouri
Moran, Jon Frederick, B.A., Yale University, '68—Duke Medical Center, Durham, North Carolina

Moses, Alan Charles, B.S., Duke University, '69—Barnes Hospital, St. Louis, Missouri

Mullinix, Janice Marie, B.A., University of Kansas, '69—Parkland Memorial Hospital, Dallas, Texas

Namey, Thomas Curtis, B.A., Thiel College, '69—McGill University Hospitals, Montreal, Canada

Nichols, Steven Henry, B.A., Vanderbilt University, '69—Jewish Hospital, St. Louis, Missouri



Novack, Mark Alan, Washington University—St. Luke's Hospital, St. Louis, Missouri

Nuelle, Douglas Gregory, B.S., University of Missouri (St. Louis), '69—Barnes Hospital, St. Louis, Missouri

Paulin, Julius Fredrick, B.A., University of Colorado, '69—St. Joseph's Hospital, Denver, Colorado

Peterson, Alan Carl, B.S., University of Michigan, '69—University of Michigan Affiliated Hospitals, Ann Arbor, Michigan

Plasse, Terry Freeman, A.B., Brandeis University, '69-Beth Israel Hospital, New York, New York

Rassen, Joshua Herbert, A.B., Harvard College, '68-Children's Hospital, San Francisco, California

Reinhard, John D'Arcy, B.A., Cornell College, '69-Michael Reese Hospital, Chicago, Illinois

Richmond, Dennis, B.S., Purdue University, '69-Naval Hospital, San Diego, California

Schroer, Kenneth Ray, Kearney State College-Barnes Hospital, St. Louis, Missouri

Scruggs, Karen LaFrance, B.A., Macalester College, '68-Massachusetts General Hospital, Boston, Massachusetts

Seegers, James Victor, B.A., Concordia Senior College, '67-Jewish Hospital, St. Louis, Missouri

Shapiro, Allan James, A.B., Stanford University, '69-St. Louis Children's Hospital, St. Louis, Missouri

Shepherd, Eugene Meredith III, B.A., David Lipscomb College, '69-University of Miami Affiliated Hospitals, Miami, Florida

Shuck, Edwin Haywood III, B.A., New College, '69-Charity Hospital, New Orleans, Louisiana

Simpson, Lucien Caldwell, B.A., David Lipscomb College, '69-North Carolina Memorial Hospital, Chapel Hill, North Carolina

Stempel, Jerrold Martin, B.S., University of Illinois, '69-University of Minnesota, Minneapolis, Minnesota

Turi, George Kenneth, A.B., Columbia University, '69-St. Louis Children's Hospital, St. Louis, Missouri

Twitchell, Annette, B.S., Washington State University, '69-University of Oklahoma Hospitals Oklahoma City, Oklahoma

Waldbaum, Lawrence Sidney, A.B., Cornell University, '69-Barnes Hospital, St. Louis, Missouri

Walters, Richard Coburn, B.S., University of Illinois, '69-Waterbury Hospital, Waterbury, Connecticut

Weaver, Nancy E., B.S., Montana State University, '69-St. Louis Children's Hospital, St. Louis, Missouri

Weintraub, Jonathan, B.A., Reed College, '69-Jewish Hospital, St. Louis, Missouri

Weisman, Robert Alan, A.B., Washington University, '69-Los Angeles County, U.S.C. Medical Center, Los Angeles, California

Weiss, Jay Harlan, A.B., Washington University, '69-University of Kentucky Medical Center, Lexington, Kentucky

White, Richard Harvey, B.A., University of California (Santa Barbara), '68-San Francisco General Hospital, San Francisco, California

White, William Gregory, B.A., College of the Holy Cross, '69-Loyola University Affiliated Hospital, Chicago, Illinois

Wilhelm, James Paul, B.S., University of Idaho, '69-Sacred Heart Hospital, Spokane, Washington

Wittenborn, John Richard, Jr., A.B., Rutgers University, '69-Presbyterian Hospital, New York, New York

Yanover, Robert Alan, University of Rochester-State University Kings County Medical Center, Brooklyn, New York

Zalcman, Steven Jay, A.B., Washington University, '68-Jewish Hospital, St. Louis, Missouri

Zerdecki, John Wells, B.A., Rice University, '69-Jewish Hospital, St. Louis, Missouri

Ziman, Ronald Bert, University of California (Santa Barbara)-Los Angeles County Harbor General Hospital, Torrance, California

Third-Year Class 1972-73

Anderson, Wilfred Louis, B.A., Fisk University, '69-Montgomery, Alabama

Bain, Michael Warren, B.S., U.S. Military Academy, '70-Franklin, Missouri

Baker, James Peter, B.S., Syracuse University, '70-Batavia, New York

Berg, Alfred Oren, B.A., Tabor College, '70-Wichita, Kansas

Berger, Mark Leslie, B.A., University of Rochester, '70—St. Louis, Missouri

Bertram, Dennis Anna, A.B., Indiana University, '70—Evansville, Indiana

Blackman, Jon Arthur, B.S., Oregon State University, '70—North Bend, Oregon

Boyers, Jerold Edmund, B.A., Knox College, '69—Teaneck, New Jersey

Bradof, James Edward, B.A., Northwestern University, '70—Franklin Park, Illinois

Broudy, Bruce Charles, B.S., Michigan State University, '70—St. Louis, Missouri

Brouillette, Robert Tate, Jr., A.B., Providence College, '69—Rockville, Maryland

Burgdorf, Max Henry, Jr., A.B., Washington University, '70—Des Moines, Iowa

Burrows, Stephen Dale, B.S., University of Illinois, '70—Urbana, Illinois

Clark, Joan Cathje, B.A., University of Minnesota, '70—Stewartville, Minnesota

Clifford, Stephen Michael, B.A., University of North Dakota, '70; B.M.S., '72—Grand Forks, North Dakota

Cohen, Milton Tepper, B.A., University of California (Berkeley), '69—Madison, Wisconsin

Cohen, Robert Martin, B.S., Brooklyn College, '66; A.M., Princeton University, '69; Ph.D., '72; M.M.S., Rutgers Medical School, '72—Brooklyn, New York

Coleman, William Sanford, B.A., Central Methodist College, '70—DeSoto, Missouri

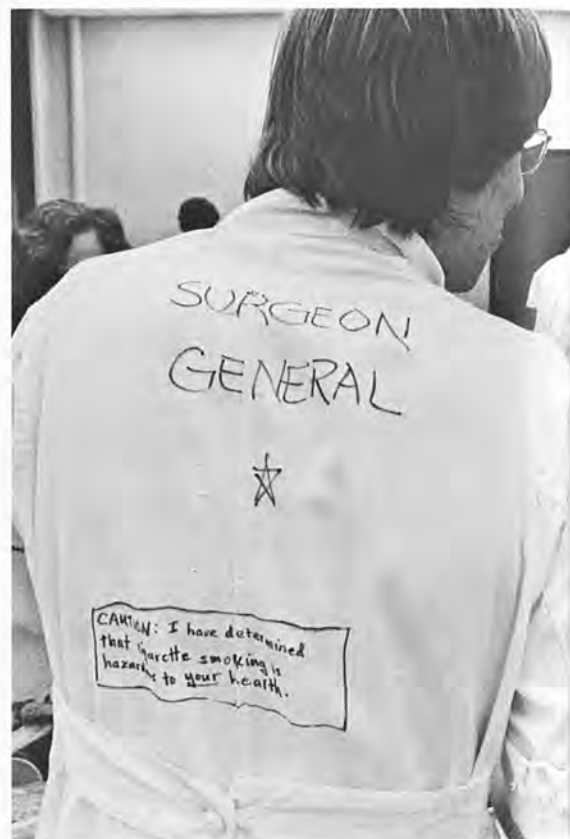
Corry, James Marshall, A.B., Grinnell College, '70—St. Louis, Missouri

Crandell, Sharon Sue, B.A., Rice University, '70—Terre Haute, Indiana

Crumbley, Arthur Jackson III, B.S., Davidson College, '70—Atlanta, Georgia

DeGuerre, Ronald Keith, Washington University—North Canton, Ohio

Depper, Joel Michael, A.B., Stanford University, '70—Woodland Hills, California



Donohoe, Louise Anne, A.B., Trinity College, '70—New York, New York

Entis, Gregory Neil, B.A., Williams College, '69—Sands Point, New York

Fischbein, Lewis Conrad, B.A., University of Rochester, '70—Short Hills, New Jersey

Fleischman, Scott Clonick, B.S., University of Illinois, '70—Chicago, Illinois

Frantz, Kurt Smith, B.A., University of Oklahoma, '70—Enid, Oklahoma

Fuller, Terry Allen, B.S., University of Notre Dame, '70—Mount Carmel, Illinois

Gangnes, Richard Alan, B.A., University of California (Santa Barbara), '70—Santa Ana, California

- Glickman, Peter, A.B., University of California, (Berkeley), '70—New York, New York
- Golden, Paul, B.S., Yale University, '70—New York, New York
- Gorman, John Carroll, B.A., University of Kansas, '70; M.M.S., Rutgers Medical School, '72—Oradell, New Jersey
- Graham, Donald Richardson, B.S., University of Notre Dame, '70—Springfield, Illinois
- Graham, Otherine, University of Oklahoma—Muskogee, Oklahoma
- Graul, Richard Steven, A.B., Washington University, '70—St. Louis, Missouri
- Greenfield, Andrew Kent, B.A., Northwestern University, '70—Old Westbury, L.I., New York
- Grimes, Pearl Evelyn, Jackson State College—Woodville, Mississippi
- Gutwein, Michael B., A.B., Harvard College, '69—West Hempstead, New York
- Hattan, Richard Alan, B.S.M.E., University of Colorado, '70—Denver, Colorado
- Herold, Robert Earl, B.A., Wabash College, '70—Evansville, Indiana
- Hoff, Mark Lloyd, A.B., University of California (Berkeley), '70—Lodi, California
- Hu, Lucy Helen, B.S., University of Maryland, '70—College Park, Maryland
- Jaffe, Mark Howard, B.A., Yale University, '70—Ardsey, New York
- Kahana, Baruch Ephraim, B.S., City College of New York, '62—Monsey, New York
- Kahn, Ronald Frank, B.A., University of Texas, '70—El Paso, Texas
- Kaplan, Roslyn Ann, B.A., Western Reserve University, '70—Staten Island, New York
- Kaufman, Kenneth Roland, A.B., Columbia University, '68; A.M., Harvard College, '69—East Norwich, New York
- Keller, David Charles, B.A., Valparaiso University, '70—Union, Illinois
- Kirkpatrick, Robert Bruce, B.S., Wisconsin State University (Eau Claire), '70—Madison, Wisconsin
- Kitchell, Margaret Anne, B.A., Reed College, '70—Ames, Iowa
- Kozak, Natalia Hyk, Washington University—Griggsville, Illinois
- Kozak, Stefan Paul, A.B., Washington University, '70—St. Louis, Missouri
- Lange, David Richard, A.B., Dartmouth College, '70—New Carlisle, Ohio
- Larrey, Richard Morris, B.A., University of Texas, '70—Houston, Texas
- Leshin, Mark, B.A., University of Texas, '70—Robstown, Texas
- Liang, Howard Grant, B.A., Yale College, '70—St. Louis, Missouri
- Lindstrom, Eric Richard, B.S., University of Washington, '70—Bremerton, Washington
- Lockett, John Stanford, B.S., U.S. Air Force Academy, '70—Lake City, Florida
- Mann, Jonathan Max, A.B., Harvard College, '69—Waban, Massachusetts
- Marsh, Kim Ernest, Indiana University—Indianapolis, Indiana
- Meredith, Stephen Charles, A.B., Brandeis University, '70—Kings Point, New York
- Meyer, Margaret Woolf, B.A., Wellesley College, '70—St. Louis, Missouri
- Minshew, Nancy Jean, Mills College—El Dorado Hills, California
- Mogelson, Stanley, A.B., Washington University, '70; B.M.S., Dartmouth Medical School, '72—Meridian, Mississippi
- Moroni, Rosemary Iolanda, B.S., University of Missouri (Columbia), '70—St. Louis, Missouri
- Nachtwey, Frederick Joseph, B.A., University of Notre Dame, '70—Springfield, Illinois
- Nahm, Moon Hea, A.B., Washington University, '70—St. Louis, Missouri
- Nunnelee, Keith Hunter, B.S., University of Wisconsin, '69—New Berlin, Wisconsin
- Oleck, Adrian Martin, B.A., Northwestern University, '70—Park Ridge, Illinois
- Orkand, Steven Paul, B.A., Reed College, '70—Los Angeles, California

Osteen, Thomas Lee, B.A., University of Kansas, '70-Kansas City, Kansas

Paull, Barry Ross, A.B., University of California (Berkeley), '65-San Francisco, California

Penkoske, Patricia Ann, A.B., Lindenwood College, '69-St. Charles, Missouri

Peskin, Edward Gene, B.S., University of Wisconsin (Madison), '70; M.M.S., Rutgers Medical School, '72-Somerset, New Jersey

Peterson, Linda Bixby, Brown University-Windham, Connecticut

Peterson, McKim Culver, B.S., Yale University, '70-Fort Collins, Colorado

Potter, Charles Roy, B.S., Michigan State University, '70-Royal Oak, Michigan

Rice, Gregory Allen, B.S., University of Washington, '70-Seattle, Washington

Rosenblum, Jerry Lee, B.A., Emory University, '70-Nashville, Tennessee

Rouse, Robert Vance, B.S., Northwestern University, '70-St. Louis, Missouri

Samson, Barry Landau, B.A., University of Wisconsin, '70-Milwaukee, Wisconsin

Scheff, Robert James, A.B., Dartmouth College, '70-St. Louis, Missouri

Schreiber, Mark Traudt, B.S., University of Nebraska, '70-Alliance, Nebraska

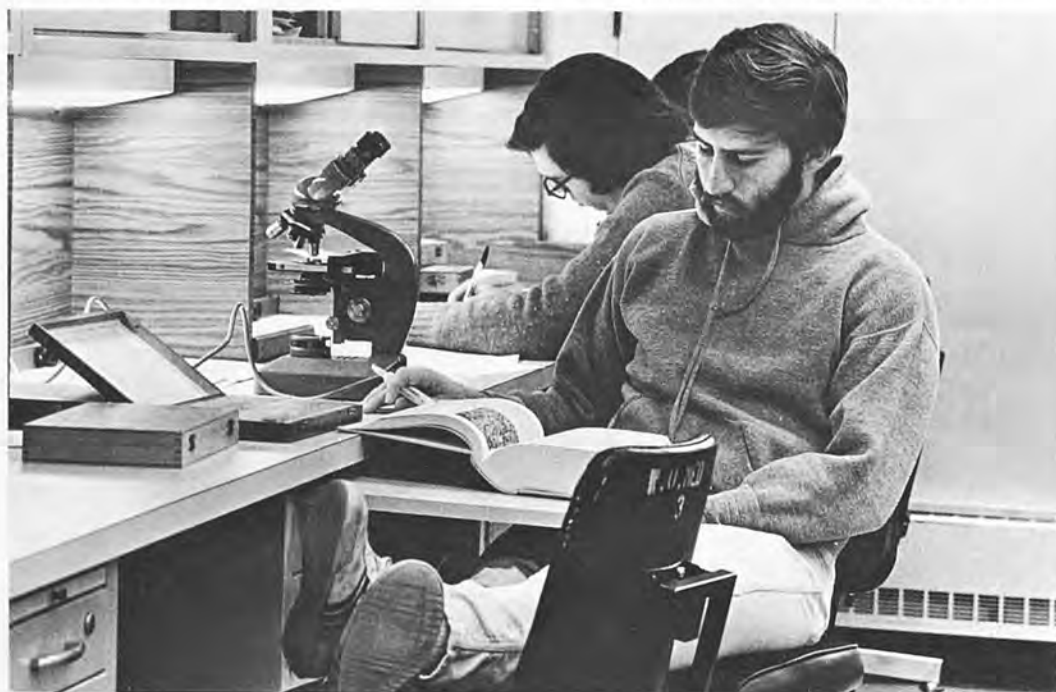
Schwartz, David Johann, B.A., University of Denver, '70-Essex Fells, New Jersey

Schwartz, Fredrick Jack, University of Nebraska-Axtell, Nebraska

Shatz, Gerald Stephen, B.A., Northwestern University, '70-St. Louis, Missouri

Sheffner, Paul Wayne, B.A., Wabash College, '70-Crawfordsville, Indiana

Silvoso, Gerald Robert, A.B., University of Missouri (Columbia), '70-Columbia, Missouri



Sitz, William Norman, B.A., College of Idaho, '70-Ontario, Oregon

Songer, William Lee, B.A., Wabash College, '70-Veedersburg, Indiana

Stratton, William Clayton, B.S., University of Illinois, '70-Wood River, Illinois

Taustine, Lloyd Ross, B.A., Vanderbilt University, '70-Louisville, Kentucky

Thomas, Leyland Arthur, Colorado State University-Georgetown, Guyana

Thuline, Dale Nathan, B.A., Seattle Pacific College, '70-Seattle, Washington

Tiefenbrunn, Alan James, A.B., Washington University, '70-St. Louis, Missouri

Timen, Sanford Martin, B.A., University of Cincinnati, '70-Mayfield Heights, Ohio

Tucker, Dolores Reynolds, B.S., St. Mary's College, '58-St. Louis, Missouri

Weidner, Bruce Van Scoyoc II, B.S., Davidson College, '69-Middletown, Ohio

Weil, David Samuel, B.S., Indiana University, '64-Bloomington, Indiana

Weiss, Robert Alan, B.A., New York University, '70-Bronx, New York

Weller, Ronald Alan, B.A., Wabash College, '70-Evansville, Indiana

Wener, Mark Howard, B.A., University of Chicago, '70-Chicago, Illinois

Wichterman, Keith Allen, B.S., University of Illinois, '71-New Berlin, Illinois

Willbrand, Jeffrey William, A.B., Harvard College, '70-St. Charles, Missouri

Williams, Michael Orval, B.A., University of Missouri (St. Louis), '70-St. Louis, Missouri

Wolbarsht, Richard Lorin, A.B., Harvard College, '70-Waban, Massachusetts

Woodrow, Thomas Wilson, Louisiana Polytechnic Institute-Alexandria, Louisiana

Yarian, David Logan, A.B., Washington University, '69-Angola, Indiana

Zeller, John Edward, B.S., Xavier University, '70-Springfield, Ohio

Second Year Class 1972-73

Andersen, David Allen, B.S., Iowa State University, '71-Yankton, South Dakota

Andrews, James Leonard, B.S., Loyola University, '71-Morton Grove, Illinois

Arrowsmith, Scott Randall, B.S., University of Michigan, '71-Munster, Indiana

Attie, Maurice Franklyn, A.B., B.S., Lafayette College, '71-Cali, Colombia

Averhart, Vernon Wendoth, B.S. (Pharm.) University of Wisconsin, '71-Burlington, Wisconsin

Barnes, James Henry, B.S., Alcorn A. and M. College, '71-Collins, Mississippi

Bartlett, Scott Paul, Weber State College-Ogden, Utah

Barton, James Michael, University of Illinois-Champaign, Illinois

Bassman, Donald Robert, A.B., Washington University, '71-St. Louis, Missouri

Bauwens, Daniel Bernard, B.S., University of Nebraska, '71-Omaha, Nebraska

Becker, Daniel Martin, B.A., University of Pennsylvania, '71-Coral Gables, Florida

Bellatti, John Walter, A.B., Illinois College, '71-Jacksonville, Illinois

Benedict, William Waite, B.S., University of Illinois, '71-Godfrey, Illinois

Berland, Lincoln Lewis, B.S., University of Wisconsin, '71-Bayside, Wisconsin

Black, Robert Mark, B.S., University of Pittsburgh, '69-Short Hills, New Jersey

Bloomfield, Ira Stephen, B.S., State University of New York (Stony Brook), '71-New York, New York

Bosley, Joseph Houston III, B.S., Washington and Lee University, '71-Shreveport, Louisiana

Brodeur, Garrett Michael, B.A., St. Louis University, '71-St. Louis, Missouri

Brown, Freeman Fletcher III, A.B., Columbia College, '71-Harwinton, Connecticut

Bruss, Reginald David, B.S., Portland State University, '71-Gresham, Oregon

Cleary, Karen Rabideau, B.S., St. Louis University, '66—Kankakee, Illinois

Cloud, William Hawley, Jr., B.S.E.E., University of Missouri (Columbia), '71—Fulton, Missouri

Deldin, Michael Bruce, B.A., Emory University, '71—Miami, Florida

Draine, Quida Deborah, B.S., Tougaloo College, '69—Jackson, Mississippi

Enger, Roberta Miller, A.B., Princeton University, '71—Platte City, Missouri

Flaherty, Robert Jean, B.A., Albion College, '71—Detroit, Michigan

Freedman, Steven Alan, B.A., University of Pennsylvania, '70—Newton, Massachusetts

Fulling, Keith Harry, B.A., Johns Hopkins University, '71—St. Louis, Missouri

Gabry, Jerome Benjamin, B.A., University of Pennsylvania, '71—Brooklyn, New York

Gersell, Deborah Jo, B.S., University of Michigan, '71—Dearborn, Michigan

Gogan, Robert Joseph, B.S., Marquette University, '71—Milwaukee, Wisconsin

Granoff, Mark Elliott, B.S., California Institute of Technology, '66; M.S., University of California (San Diego), '68—La Jolla, California

Greenberg, Arthur, B.S., Massachusetts Institute of Technology, '71—New Rochelle, New York

Grubb, Stephen Dale, A.B., University of Missouri (Columbia), '71—Fairfax, Missouri

Hammerman, Harley Jay, A.B., Washington University, '71—St. Louis, Missouri

Hansburg, Daniel, B.S., University of Chicago, '70—Uniontown, Ohio

Hansen, Gary Richard, B.A., Wabash College, '71—Fort Wayne, Indiana

Harrison, Theodore Edward, A.B., Washington University, '71—Odessa, Texas

Hemphill, Gregory Lynn, B.S., University of Texas, Austin, '71—Austin, Texas

Hendrickson, Rachel Ann, B.A., Augsburg College, '71—Clarkfield, Minnesota

Houston, Thomas Michael, B.A., University of Toledo, '71—Toledo, Ohio

Hubert, John William, B.A., Wabash College, '71—West Lafayette, Indiana

Hudson, James Melvin, A.B., Harris Teachers College, '66—St. Louis, Missouri

Hughes, Thomas Arthur, B.A., University of Dallas, '71—Dallas, Texas

Humenny, Edward Samuel, Jr., A.B., Washington University, '71—Fullerton, California

Hurt, Allen Vincent, West Virginia University—Morgantown, West Virginia

Hutchinson, Laurence Dow, B.S., Pacific University, '71—San Francisco, California

Isserman, Michael Jay, A.B., Harvard College, '71—St. Louis, Missouri

Julian, Bruce Allen, B.A., Wabash College, '71—Evansville, Indiana

Jung, Frank Martin, B.S., University of California (San Diego), '71—San Diego, California

Kapoor, Wishwa Nath, B.S.Ch.E., Washington University, '71—Kabul, Afghanistan

Kesler, James Lester, B.S., University of Illinois, '71—O'Fallon, Illinois

Kleinman, Richard Gary, Ohio State University—Mayfield Heights, Ohio

Kling, Ian Andrew, B.S., California Institute of Technology, '71—Miami, Florida

Koen, Lyle Dorsey, B.S., U.S. Air Force Academy, '66; M.B.A., University of California (Los Angeles), '67—Bossier City, Louisiana

Krook, Peter Michael, Jr., B.A., University of Washington, '71—Edmonds, Washington

Leder, Eric Harvey, University of Colorado—Denver, Colorado

Leech, Irene Patricia, A.B., Boston University, '71—Johnstown, Pennsylvania

Levin, Arnold Lawrence, B.S., University of Illinois, '71—Wilmette, Illinois

Lundell, Caroline Jeanne, B.S., Colorado State University, '71—Bel Air, Maryland

Lyles, Thomas Orvan, B.A., Southern Illinois University, '69—Chicago, Illinois

Marcus, Joseph Ned, B.S., University of Michigan, '71—St. Louis, Missouri

Mattis, Henry Edward, B.S., University of Illinois, '71—Flora, Illinois

Mead, Charles Norman, B.A., Northwestern University, '69—Cheyenne, Wyoming

Meredith, John Todd, B.S., Weber State College, '71—Odgen, Utah

Meyer, David Andrew, B.A., Transylvania University, '71—Mount Carmel, Illinois

Miller, Brian George, B.S., University of Idaho, '71—Boise, Idaho

Nadler, Paul Ira, B.A., Queens College, '71—Bayside, New York

Nelken, Michael Alonzo, B.A., Reed College, '60—Berkeley, California



Newton, Charles Gordon, Jr., A.B., Indiana University, '71—Dayton, Ohio

Newton, Patricia Ann, B.S., A., M. and N. College, Arkansas, '67; M.A., George Peabody College, '69—Little Rock, Arkansas

Oestrich, Charles Jeffrey, A.B., Colgate University, '71—Mexico, Maine

Olander, David Shai, A.B., Washington University, '64; A.M., '65; Ph.D., '67—Chicago, Illinois

Pasternak, Joseph Farrell, B.A., University of Iowa, '71—Des Moines, Iowa

Perry, Horace Mitchell III, B.A., Williams College, '71—St. Louis, Missouri

Price, Harry Donald, B.S., West Virginia University, '64; Ph.D., Johns Hopkins University, '69—Belington, West Virginia

Rollings, John William, Washington University—Springfield, Missouri

Rubinfeld, Paul Ira, A.B., Washington University, '71—Millburn, New Jersey

Ryall, Jo-Ellyn M., A.B., Douglass College, '71—Irvington, New Jersey

Sandefur, Richard Maxwell, Jr., B.S., Ohio State University, '71—Campbellsville, Kentucky

Schainker, Bruce Allan, A.B., Washington University, '71—St. Louis, Missouri

Schlansky, Barbara, A.B., Brandeis University, '71—Brooklyn, New York

Schoepfle, Walter John, B.A., Northwestern University, '71—Mountain Brook, Alabama

Sedgwick, William Glenn, A.B., Princeton University, '71—St. Louis, Missouri

Shine, Thomas Edward, A.B., Princeton University, '71—St. Louis, Missouri

Sindel, Robert William, A.B., Washington University, '69—St. Louis, Missouri

Smith, Leroy Carter, B.S., St. Augustine's College, '71—Hobgood, North Carolina

Southworth, William Frederick, A.B., Washington University, '69—St. Louis, Missouri

Stillings, Wayne Andrew, A.B., Oberlin College, '71—Appleton, Wisconsin

Stitham, Mark Dillen, A.B., Dartmouth College, '71—Dover-Foxcroft, Maine

Strom, Howard Eric, B.A., Emory University, '71—North Miami Beach, Florida

Stromberg, Brent Vern, B.S., Brigham Young University, '71—St. Louis, Missouri

Taylor, Michael Verne, California State College (Long Beach)—Long Beach, California

Tiefenbrunn, Sharon Frost, A.B., Washington University, '71—St. Louis, Missouri

Tollefsen, Sherida Lyman, A.B., Grinnell College, '71—Gering, Nebraska

Treese, Mary Margaret, A.B., Boston University, '71—Newton Centre, Massachusetts

Ulbright, Thomas Martin, A.B., Washington University, '71—St. Louis, Missouri

Vogel, Gordon Allen, Wabash College—Mount Vernon, Indiana

Weil, David Jeffrey, Stanford University—Wayne, Pennsylvania

Wheatt, Theodis Morris, B.S., Tuskegee Institute, '71—Montgomery, Alabama

Williams, Julian Carroll, B.A., Rice University, '67; M.S., Massachusetts Institute of Technology, '68; Ph.D., University of California, '72—Omaha, Nebraska

Yedlin, Steven Todd, Oakland University—Bloomfield Hills, Michigan

First-Year Class 1972-73

Abensohn, Meryl Kaye, A.B., Washington University, '72—Washington, D.C.

Anschuetz, Robert H., A.B., Harvard College, '65—Berkeley, California

Ardourel, Harold Duane, B.A., University of Colorado, '72—Boulder, Colorado

Ater, Stewart Bruce, University of Colorado—Denver, Colorado

AufderHeide, John Frederick, A.B., University of Missouri (Columbia), '72—St. Louis, Missouri

Baumwell, Sterling Howard, B.A., University of Rochester, '72—Flushing, New York

Belcher, James Edward, B.S., Texas Southern University, '72—Houston, Texas

Blanchard, Lawrence Eley III, B.A., Duke University, '72—Richmond, Virginia

Blumenthal, Mark Frederick, A.B., Dartmouth College, '72—St. Louis, Missouri

Bortz, Sheri Lee, A.B., University of Illinois (Urbana), '72—Highland Park, Illinois

Bosker, Gideon, B.A., University of Pennsylvania, '72—Evanston, Illinois



Boyer, Richard Alan, B.A., California State College (Fullerton), '71—Lompoc, California

Brinkman, Robert Allen, B.S., Creighton University, '72—Omaha, Nebraska

Brown, Frank Reginald III, B.S., Stanford University, '65; M.S., '67; Ph.D., Harvard University, '71—Independence, Missouri

Butcher, Eugene Corning, B.S., Massachusetts Institute of Technology, '72—St. Louis, Missouri

Canny, Christopher Richard, A.B., Stanford University, '68—New York, New York

- Cantieri, John Stephen, University of Chicago—Mount Prospect, Illinois
- Carlile, Paul Vore, Jr., B.A., University of Oklahoma, '72—Sallisaw, Oklahoma
- Carrasco, Charles Ray, Weber State College—Ogden, Utah
- Chausow, Alan Martin, B.S., University of Illinois (Urbana), '72—Highland Park, Illinois
- Cheng, Tien Hsin, B.S., University of California (Davis), '67—Taipei, Taiwan
- Cooke, Dennis Brian, University of California (Santa Barbara)—Kentfield, California
- Cooper, Thomas Warren, B.A., Johns Hopkins University, '72—Teaneck, New Jersey
- Croom, Dorwyn Wayne II, Southwestern at Memphis, '72—Malden, Missouri
- Culbertson, Charles Evans, B.A., Northwestern University, '72—Darien, Connecticut
- Dalton, Randall Elliott, B.S., Howard University, '72—Cincinnati, Ohio
- Deever, Virginia Diane, A.B., Grinnell College, '72—Tempe, Arizona
- Edelen, Donald Benedict, B.S., University of Notre Dame, '72—Springfield, Kentucky
- Eider, Wendy Roberta, B.A., Queens College, '71—Flushing, New York
- Elliot, Diane Louise, University of Oregon—Salem, Oregon
- Ensz, Gary Richard, University of Nebraska—Beatrice, Nebraska
- Flint, Colleen Kyle, University of Redlands—Redlands, California
- Frank, Bruce Sherwin, B.S., Massachusetts Institute of Technology, '72—Milwaukee, Wisconsin
- Gammon, Kenneth Lee, B.S., University of North Carolina, '69—Raleigh, North Carolina
- Gibbs, Lynn Ralph, Kansas State University—Houston, Texas
- Glazer, Harvey S., A.B., Washington University, '71—St. Louis, Missouri
- Goldman, Daniel Isser, B.A., University of Chicago, '72—Norfolk, Virginia
- Goran, David Alan, A.B., University of Michigan, '72—St. Louis, Missouri
- Greenberger, Jonathan Carl, B.S., Purdue University, '72—West Lafayette, Indiana
- Haar, Richard Henry, Case-Western Reserve University—Plainview, New York
- Hamlin, Thomas Allen, B.A., University of Texas, '72—Sugar Land, Texas
- Hammer, Helen Lois, B.S., University of Redlands, '72—China Lake, California
- Hammerman, Albert Mark, Washington University—St. Louis, Missouri
- Hammons, Glenn Terrill, B.A., University of Kansas, '66; M.S., Massachusetts Institute of Technology, '71—Oswego, Kansas
- Handler, Glenn Andrew, B.S., Massachusetts Institute of Technology, '71; M.S., University of Michigan, '72—New Rochelle, New York
- Hartmann, Thomas Gerard, B.S.Ch.E., Washington University, '71—St. Louis, Missouri
- Hegge, Catherine Gail, B.A., St. Olaf College, '72—Eau Claire, Wisconsin
- Henry, William John, B.A., Augsburg College, '72—Foley, Minnesota
- Hetland, Ruth Ellen, Cornell College—Mount Vernon, Iowa
- Hsieh, Karl Su, Vassar College—Kowloon, Hong Kong
- Jackson, Darwin Clinton, B.S., Ohio State University, '72—Cleveland, Ohio
- Johnson, Courtney Reagor, A.B., Harvard College, '67—Cheyenne, Wyoming
- Jolley, Stephen G., B.S., University of Utah, '72—Salt Lake City, Utah
- Jones, Antinez Valancia, Washington University—St. Louis, Missouri
- Kiyomura, Robert Shigeru, B.A., University of California (San Diego), '72—Bellflower, California
- Koppenbrink, Walter Edwin III, A.B., University of Missouri (Columbia), '72—Higginsville, Missouri

Kream, Steven Jonathan, B.A., New York University, '72—Glen Cove, New York

Krohn, Jacqueline Anne, B.S., University of New Mexico, '72—Los Alamos, New Mexico

Lai, Cheong Fay, B.S., California Institute of Technology, '71—Kowloon, Hong Kong

Lamberg, Robert Louis, B.S., University of Missouri (St. Louis), '72—St. Louis, Missouri

Lee, Kerwin Jong, B.A., University of California (San Diego), '72—Palo Alto, California

Lewis, Duaine Lamount, University of Michigan—Detroit, Michigan

Lewis, Michael, B.S., Washington University, '72—East St. Louis, Illinois

Litovitz, Toby Lynn, Oberlin College—Silver Spring, Maryland

Lochmiller, Richard Gordon, B.A., University of Illinois, '72—Decatur, Illinois

Loney, Linda Christine, B.A., University of Kansas, '71—Marion, Kansas

Loshin, David Mark, A.B., Indiana University, '72—Bloomington, Indiana

Lowry, Emily Gerow, A.B., Boston University, '72—St. Louis, Missouri

Malas, Kenneth Lee, B.S., Juniata College, '69—Buffalo Mills, Pennsylvania

Manigo, Oliver, Jr., B.S., Savannah State College, '71—Savannah, Georgia

Matthews, O. L., Tuskegee Institute—Indianola, Mississippi

Mavrelis, Peter George, B.A., University of Chicago, '72—Oak Park, Illinois

McDonnell, William Foskey III, B.S.E., Tulane University, '72—Gulfport, Mississippi

Mellon, Monte Tim, B.A., University of Colorado, '71—Johnstown, Colorado

Mendenhall, Milton Toshio, B.S., Spring Hill College, '72—Washington, D.C.

Metcalf, John Holland, B.A., DePauw University, '72—St. Louis, Missouri

Milton, John Anthony, B.A., College of the Holy Cross, '72—St. Louis, Missouri

Mitchell, Bonnie Louise, B.A., Dillard University, '67; M.A., Bryn Mawr College, '70—Leesburg, Florida

Moss, Kenneth Steven, University of Missouri (St. Louis)—St. Louis, Missouri

Moxley, George Forest, B.A., Kansas State University, '72—Council Grove, Kansas

Myers, Michael Steven, B.A., University of Missouri (St. Louis), '72—St. Louis, Missouri

Myers, Stuart Ira, Temple University—Melrose Park, Pennsylvania

Newsome, Carlton Morris, B.S., Philander Smith College, '72—Sparkman, Arkansas

Olson, Neal Reinhart, A.B., Washington University, '72—Great Falls, Montana

Osborn, Linda Ann, B.S., Purdue University, '68—St. Louis, Missouri

Partain, Clarence Leon, B.S.N.E., University of Tennessee, '63; M.S.N.E., Purdue University, '65; Ph.D., '67—Columbia, Missouri

Pfaller, Michael Andy, B.A., Linfield College, '72—Eugene, Oregon

Pohlman, Thomas Ralph, B.A., St. Louis University, '72—Godfrey, Illinois

Pratt, Pamela Jo, A.B., Washington University, '71—White Hall, Illinois

Puro, Edward Allen, B.S., University of Toronto, '62; Ph.D., '70—Toronto, Canada

Rasmussen, Kent Robert, B.S.E., Arizona State University, '72—Tempe, Arizona

Ringenberg, Beverly June, B.A., Northwestern University, '72—St. Louis, Missouri

Robins, James Matthew, Harvard College—St. Louis, Missouri

Rugh, Kenneth Scott, B.S., U.S. Air Force Academy, '72—Longview, Washington

Samuels, Lawrence Elliott, B.A., University of Texas, '72—St. Louis, Missouri

San Antonio, Richard Patrick, B.S., Worcester Polytechnic Institute, '71—Providence, Rhode Island

Schall, James Edward, Franklin and Marshall College—Pittsburgh, Pennsylvania

Schilling, John Philip, B.A., Cornell College, '69—West Allis, Wisconsin

Shanahan, Dennis Francis, A.B., Middlebury College, '71—Tustin, California

Sherman, Neil Edward, B.S., Pennsylvania State University, '68—Denver, Colorado

Siegfried, Barry Alan, B.S.Ch.E., Washington University, '72—St. Louis, Missouri

Siemers, Carolyn Marie, A.B., Lindenwood College, '70—St. Louis, Missouri

Simpson, Reed Earl, B.A., Wabash College, '72—Princeton, Indiana

Skinner, Stanley Ava, Washington University—Fort Smith, Arkansas

Snyder, Scott Walter, B.A., University of Colorado, '72—Fort Collins, Colorado

Spencer, Richard Beck, B.S., University of Utah, '72—Murray, Utah

Spirn, Irwin, B.S., City College of New York, '59; M.S., University of Illinois, '60; Ph.D., New York University, '66—Chicago, Illinois

Stapler, Patricia Anne, B.S., University of Arizona, '72—Northboro, Massachusetts

Stempel, Laurence Eric, B.S., Michigan State University, '72—Northbrook, Illinois

Sumers, Karen Deborah, B.A., University of Pennsylvania, '72—Roslyn, New York

Todd, Kathleen Gail, B.A., Pomona College, '72—Portland, Oregon

Toth, Phillip Dennis, B.S., Purdue University, '72—Indianapolis, Indiana

Trice, Jill Ellen, B.S., Philander Smith College, '72—Little Rock, Arkansas

Turnbaugh, Thomas Ray, A.B., University of Missouri (Columbia), '72—Cuba, Missouri

Wasdyke, Wesley Roger, A.B., Hope College, '64; B.D., Episcopal Theological School, '69—Cincinnati, Ohio

Weiner, Evelyn Sarah, A.B., Goucher College, '71—Baltimore, Maryland

Wheeler, Carroll Ray, B.S., Cameron State College, '71—Lawton, Oklahoma

Willis, Thomas Malcolm, B.A., University of Colorado, '72—Grand Junction, Colorado

Wilson, James David, B.S., University of Texas, '72—Austin, Texas

Wilson, Tyrone Videst, B.S., Howard University, '72—Mer Rouge, Louisiana

Zide, Sheldon Lawrence, A.B., Washington University, '72—St. Louis, Missouri

Zotos, Veronica Demetra, A.B., Washington University, '72—St. Louis, Missouri



MEDICAL SCIENTIST TRAINING PROGRAM

**Doctor of Medicine and
Doctor of Philosophy Degrees**

Sixth-Year Trainee 1972-73

Spiegel, Gregory W., A.B., Washington University, '67—St. Louis, Missouri

Fifth-Year Trainees 1972-73

Collins, Myra Lou, B.S., Duke University, '68—Marshville, North Carolina

Herbold, David Robert, A.B., Washington University, '68—Shaker Heights, Ohio

Jacobs, Richard Alan, A.B., Oberlin College, '68—St. Louis, Missouri

Murfin, Wesley Warren, B.A., Washington and Lee University, '68—Decatur, Illinois

Fourth-Year Trainees 1972-73

Baenziger, Jacques Ulrich, B.A., New College, '69—Knoxville, Tennessee

Schmidt, Robert Edward, A.B., Washington University, '69—St. Louis, Missouri

Vine, William H., Washington University—Dallas, Texas

Third-Year Trainees 1972-73

Clark, Howard Brent, B.A., Macalester College, '70—Truman, Minnesota

Douglas, James Reyburn, Jr., A.B., Dartmouth College, '70—Memphis, Tennessee

Edelstein, Mark Binder, University of Wisconsin—St. Louis, Missouri

Krettek, John Edwin, Jr., B.S., Regis College, '70—Council Bluffs, Iowa

Lawrence, Charles Barnes, B.S., Massachusetts Institute of Technology, '70—Binghamton, New York

Schwartz, Lawrence Barry, B.S., University of Illinois, '70—Glencoe, Illinois

Siegel, Richard Lawrence, A.B., Washington University, '70—Miami, Florida

Turk, John Wayne, A.B., Washington University, '70—Crystal City, Missouri

Second-Year Trainees 1972-73

Bedford, Michael Ray, B.S.E.E., Northwestern University, '71—Watertown, Wisconsin



Boron, Walter Frank, B.A., St. Louis University, '71—Elyria, Ohio

Clifford, David Burr, B.A., Southwestern University, Texas, '71—Georgetown, Texas

Cyrlin, Marshall Nelson, B.A., Northwestern University, '71—Flushing, New York

Frost, John James, A.B., Washington University, '71—Tulsa, Oklahoma

Greene, Warner Craig, A.B., Stanford University, '71—Mesa, Arizona

Mayers, Douglas Bruce, A.B., Washington University, '71—Coral Gables, Florida

Nelson, Donald Michael, B.A., Cornell College, '71—Oneida, Illinois

Ponce, Juan Francisco, Washington University—Baltimore, Maryland

Rubin, Eugene Harold, B.A., University of Rochester, '71—Brookline, Massachusetts

Stricklin, George Putnam, B.A., David Lipscomb College, '71—Palatka, Florida

First-Year Trainees 1972-73

Estridge, Mitchael Gene, B.A., Berea College, '72—Berea, Kentucky

Leavitt, Randi Yvette, B.S., Brooklyn College, '72—Brooklyn, New York

Magarik, David Eric, B.S., State University of New York at Stony Brook, '72—Old Bethpage, New York

Pischel, Ken Donald, B.S., California Institute of Technology, '72—Santa Barbara, California

Risch, Samuel Craig, A.B., Stanford University, '72—Lancaster, Ohio

Saper, Clifford Baird, B.S., University of Illinois, '72; M.S., '72—Highland Park, Illinois

Silverman, Robert Eliot, B.A., University of Pennsylvania, '72—Silver Spring, Maryland

Warren, Robert Wells, B.A., Yale University, '72—Athens, Georgia

Zimmerman, Donald Eugene, B.S.E.E., Massachusetts Institute of Technology, '70; M.S.E.E., '70—Overland Park, Kansas

GRADUATE PROGRAM IN HEALTH CARE ADMINISTRATION

Second-Year Class 1972-73

Blumentritt, Robert Edward, A.B., University of Missouri, '70—Florissant, Missouri

Brodhead, Robert Tipton, B.S., Carroll College, '70—Wausau, Wisconsin

Burke, William Corbin, A.B., Colgate University, '54; M.A., American University, '60—St. Louis, Missouri

Bushmaier, Jim Edwin, B.S., University of Arkansas, '51—Little Rock, Arkansas

Campbell, Bruce Crichton, B.A., Lake Forest College, '69—Chicago, Illinois

Carey, Sister Mary Julianne, B.S., Webster College, '55—New Orleans, Louisiana

Carey, Robert H., A.B., University of Missouri, '57—Superior, Wisconsin

Clement, Naylor Bruce, B.A., Cornell College, '71—Mt. Vernon, Iowa

Coffman, Don Lee, B.S., Oklahoma Baptist University, '71—Wagoner, Oklahoma

Cox, Harold Gray, B.A., University of Minnesota, '69—St. Paul, Minnesota

Crerand, Raymond Francis, B.S., City University of New York, '70—Dublin, Ireland

Curtis, Robert Stephen, B.A., University of Connecticut, '64—Mansfield Center, Connecticut

Divine, Arthur Eugene, B.A., Texas Christian University, '66—Fort Worth, Texas

Edwards, Richard Leon, B.S.B.A., Rockhurst College, '71—Kansas City, Kansas

Etheridge, Margaret Dwyer, B.A., Emory University, '70—Atlanta, Georgia

Gelder, Michael Allan, B.A., Michigan State University, '71—East Lansing, Michigan

Gielow, Curtis Charles, B.S., St. Louis College of Pharmacy, '68—Highland Park, Illinois

Grisham, Harold Richard, B.S., University of Oklahoma, '68—Ponca City, Oklahoma

Hall, Dennis Allison, B.S.C., University of Louisville, '71—Valley State, Kentucky

1922 The School of Medicine

Hamako, Herbert Masatak, B.A., University of California at Los Angeles, '63—Los Angeles, California

Hull, James Preston, B.B.A., University of Texas, '62—Houston, Texas

Hutchinson, Robert Michael, B.S., Seattle University, '67—Seattle, Washington

Lazorchak, Joseph Francis, B.A., Cannon College, '64—Erie, Cleveland Heights, Ohio

Love, Robert Mershon, B.S., Washington University, '60—St. Louis, Missouri

Marcoux, Kenneth Alan, B.S., University of Arizona, '62; M.B.A., '63—Tucson, Arizona

Muckerman, Peter Albert, B.A., University of Missouri, '71—St. Louis, Missouri

Oliver, Thornal Goodloe, B.S., Tennessee State University, '56—Topeka, Kansas

Rayburn, John Michael, B.S., University of Tennessee, '62; M.B.A., Memphis State University, '71—Memphis, Tennessee

Rehak, Thomas James, B.A., University of Puget Sound, '70—Tacoma, Washington

Roodman, Richard David, B.S., University of Missouri, '71—St. Louis, Missouri

Russell, Mark Richards, A.B., Marquette University, '71—Putnam, Connecticut

Scavotto, Michael Anthony, B.A., Beloit College, '68—West Roxbury, Massachusetts

Schneider, John Ryan, B.A., University of Kansas, '71—Columbus, Nebraska

Shanika, Gregory Roland, B.S., University of Missouri, '69—St. Louis, Missouri

Smith, Gary Wayne, B.S., University of Mississippi, '70—Memphis, Tennessee

Sutton, Gary Lee, B.S., Centenary College of Louisiana, '68—Shreveport, Louisiana

Struble, Russell Eugene, B.S., North Dakota State University, '63—Fargo, North Dakota

Swift, Edson Edix, B.A., Loras College, '69—Mason City, Iowa

Waller, Burton Woodrow, Jr., B.S., University of Tennessee, '71—Balinor, Tennessee

Walsh, John Russell, B.A., College of the Holy Cross, '70—Beverly Massachusetts

White, Alexander Ross, B.A., College of William and Mary, '63—O'Fallon, Illinois

Zahradka, James Fred, B.S., University of Wisconsin, '65—Madison, Wisconsin

First-Year Class 1972-73

Clark, Daniel Augustine, B.A., University of Dayton, '72—Chicago, Illinois

Coleman, Danny Charles, B.S., Oklahoma State University, '66; M.B.A., University of Denver, '68—Duncan, Oklahoma

Cottongim, Gary, B.S., Oklahoma State University, '70—Stillwater, Oklahoma

Deen, Robert Vincent, B.B.A., Texas Christian University, '69—Little Rock, Arkansas

Deming, Michael Scott, B.A., Albion College, '71—Jackson, Michigan

Eckenhoff, Edward Alvin, A.B., Transylvania University, '66; M.A., University of Kentucky, '68—Lexington, Kentucky

Farr, Leonard Alfred, B.S., Louisiana State University, '69—Lafayette, Louisiana

Faulk, Alfred Donald, Jr., B.S.I.E., Georgia Institute of Technology, '71—Macon, Georgia

Feth, Joseph Stephen, B.S., Duquesne University, '68—Tacoma, Washington

Gibbs, Richard Charles, B.S., Church College of Hawaii, '71—Laie, Oahu, Hawaii

Gradman, Temima Skoff, A.B., Washington University, '70—St. Louis, Missouri

Greene, Gary Jay, B.A., Ohio State University, '67—University Heights, Ohio

Griffin, William Gary, B.S.Ph., University of Mississippi, '72—Raymond, Mississippi

Gruber, Allen George, B.S., Beloit College, '68—Willoughby, Ohio

Gwyn, James Curfman, A.B., Knox College, '63; M.Ed., University of Missouri, '66—Webster Groves, Missouri

Hanko, James Fredric, B.A., University of Minnesota, '69—Colorado Springs, Colorado

Hicks, John David, B.A., Baylor University, '67; M.S.W., University of Arkansas, '70—Little Rock, Arkansas

Hoeft, Thomas Merle, B.S., Carroll College, '69—Appleton, Wisconsin

Johnson, James Peter, B.S., Kansas University, '70—Evanston, Illinois

Kaigler, James Streett, B.B.A., University of Mississippi, '66—Clarksdale, Mississippi

King, Alvin Brock, B.S.Ph., St. Louis College of Pharmacy, '70—Dulce, New Mexico

Knox, Samuel Barnes, B.A., University of Texas, '71—Tyler, Texas

Lieu, Geoffrey Sek Yiu, B.A., St. Olaf College, '72—Kowloon, Hong Kong

Neidenbach, Joseph John, B.S., College of the Holy Cross, '67—Downers Grove, Illinois

Nielsen, Steven Earl, B.S., Brigham Young University, '71—Granada Hills, California

Place, Brock Lambert, B.A., University of Utah, '72—Salt Lake City, Utah

Prout, John Snowden, B.S., Bowling Green State University, '72—Columbus, Ohio

Read, John Larry, B.S., Lamar State College of Technology, '68—Woodville, Texas

Roundtree, Lester James, B.A., University of New Hampshire, '63—Belle Glade, Florida

Rowe, David Edward, B.S., Union College, '67—Schenectady, Chagrin Falls, Ohio

Schrader, Michael Eugene, B.A., Michigan State University, '72—East Lansing, Michigan

Seegers, John Martin, B.A., Southern Illinois University, '68—Oak Park, Illinois



Smith, Gordon Lloyd, B.S., University of Tulsa, '70—Winnipeg, Canada

Somers, Elton James, B.S., St. Louis University, '71—Belleville, Illinois

Tesar, James Dennis, B.S., Southern Illinois University, '72—Belleville, Illinois

Theis, Thomas John, B.S., Northern Illinois University, '70—Aurora, Illinois

Tierney, Thomas Mathew, B.B.A., Loyola University, '71—Oak Park, Illinois

Trembath, Douglas Roy, B.S., Carroll College, '69—Wausau, Wisconsin

Tucker, John Albert, B.B.A., University of Texas, '70—Houston, Texas

Wallace, Diane Amanda, B.S., University of Tulsa, '70—St. Louis, Mo.

Wallace, Robert Francis, B.A., St. Leo College, '72—Niles Illinois



PROGRAM IN OCCUPATIONAL THERAPY

Senior Class 1972-73

Christman, Eleanor Lucy, B.A., Webster College, '67—St. Louis, Missouri

Conley, Danise, Eastern Kentucky University—Garrett, Kentucky

Fischer, Nancy Asther, Iowa State University—Marcus, Iowa

Flaherty, Christine Kinsel, Millikin University—Park Forest, Illinois

Garrity, Kathleen H., B.S., Marquette University, '59—Chesterfield, Missouri

Hammack, Mary Leetta, B.A., Notre Dame College (St. Louis), '67—St. Louis, Missouri

Hansen, Marsha Bassett, B.S., Lindenwood College, '71—St. Louis, Missouri

Heller, Pamela Wartey, University of Missouri—St. Louis, Missouri

Kuxhaus, Mary Katherine, Washington University—Denver, Colorado

Leung, Sabrina Wai-Sheung, Washington University—Hong Kong

Leviton, Anne Elizabeth, Washington University—Indianapolis, Indiana

Lilley, Marcia Dorothy, Southern Illinois University—Alton, Illinois

Lubin, Carol Ellen, Indiana University—Highland Park, Illinois

Manning, Michelle, Ohio State University—St. Louis, Missouri

Meredith, Judith Herz, B.A., Washington University, '71—St. Louis, Missouri

Okon, Eno, Women's Training College (Nigeria)—St. Louis, Missouri

Ponciroli, Karen Weinberger, Colorado State University—St. Louis, Missouri

Riordan, Theresa Anne, Forest Park Community College—St. Louis, Mo.

Schwartz, Susan Roberta, Washington University—Peoria, Illinois

Shimokawa, Susan Sachie, Washington University—Honolulu, Hawaii

Solomon, Mickie Lynne, Washington University—Cincinnati, Ohio

Williams, Winona Claire, Winston-Salem State University—Asheville, North Carolina

Wood, Susan Deborah, University of North Carolina—Black Mountain, North Carolina

Junior Class 1972-73

Adler, Marjorie Joan, Washington University—Beachwood, Ohio

Beer, Sarah Catherine, Marion College—Angola, Indiana

Benson, David Murville, Concordia College—St. Louis, Missouri

Bernstein, Amy Beth, Central Connecticut State College; Washington University—Stamford, Connecticut



Brown, Virgia L., Southern Illinois University; Forest Park Junior College—St. Louis, Missouri

Candage, Jean, Longwood College—Mechanicsville, Virginia

Cohen, Elaine Roberta, Washington University—Studio City, California

Glauber, Carol Dinah, Washington University—Hewlett, New York

Hakanson, Janet Lesley, Lasell Junior College—Woburn, Massachusetts

Hill, Jennifer Jane, Muskingum College; Washington University—Florissant, Missouri

Horstmann, Kathleen Ruth, Valparaiso University; University of Missouri—St. Louis, Missouri

Jaffe, Roberta Lyn, Bradley University—Beachwood, Ohio

Jensen, Terri Sue, Iowa State University—Audubon, Iowa

Kielhofner, Gary Wayne, B.A., St. Louis University, '71—Oran, Missouri

Kniemann, Kathleen Marie, Washington University—Belleville, Illinois

Loman, Susan Tamara, Washington University—Glencoe, Illinois

McDonough, Mary Anne, B.A., Rosary College, '69—St. Louis, Missouri

McGrew, Debra Kay, Kearney State College—Seward, Nebraska

Manchester, Jeffra Kathy, Catonsville Community College—Baltimore, Maryland

Mertens, Mary Jane, University of Wisconsin—Kiel, Wisconsin

Osterhus, Susan Carol, Belleville Area College; Southern Illinois University—O'Fallon, Illinois

Parham, Carol Anne, Montgomery College—Silver Spring, Maryland

Rolf, Ronald James, Meramec Community College—St. Louis, Missouri

Silvers, Cheryl Diane, Washington University—Oklahoma City, Oklahoma

Weinstein, Amy Susan, University of Colorado; Washington University—Winnetka, Illinois

Youngstrom, Christine Dale, Washington University—Burlington, Iowa

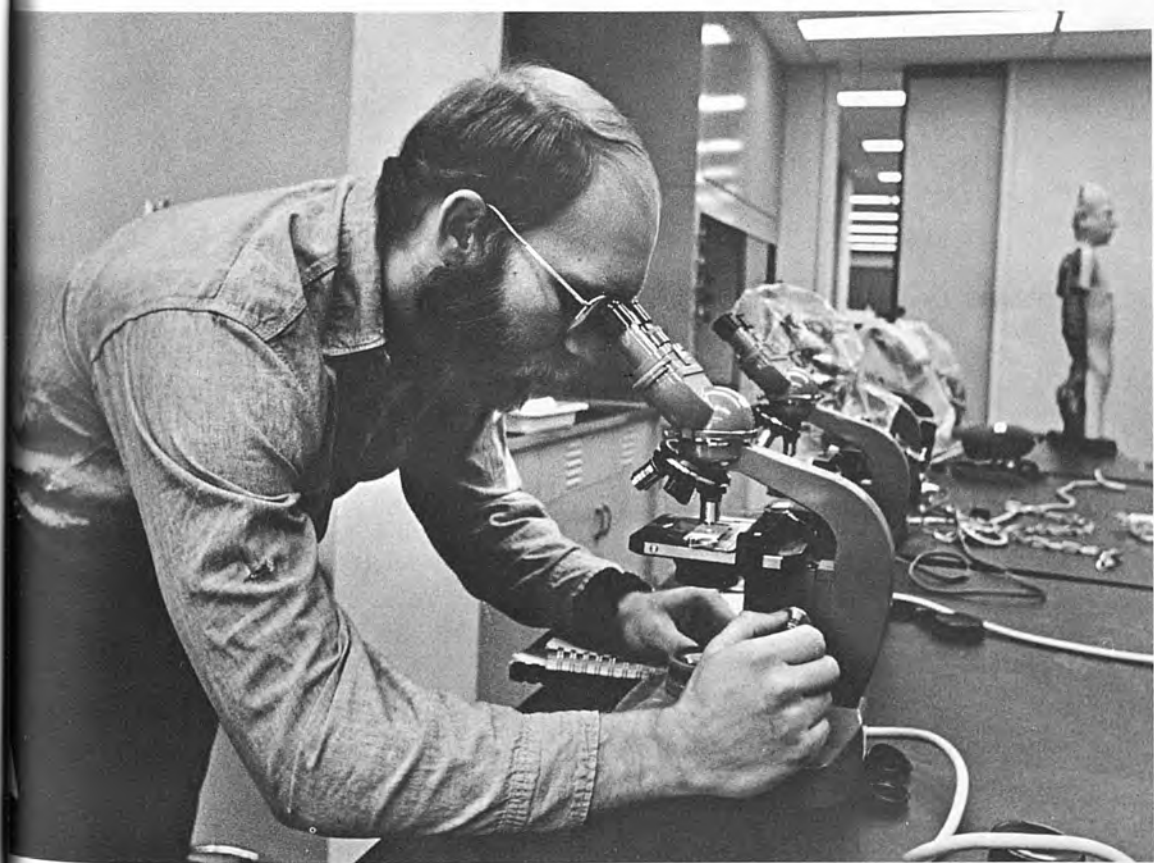
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Senior Class 1972-73

Anderson, Linda Ann Wilson, Morningside College—Boone, Iowa
 Buechler, Richard Alan, Northwestern University—Belleville, Illinois
 Collier, Christine Lee, Stephens College—Farmer City, Illinois
 Conry, Joan Adrienne, Washington University—Midland, Texas
 Diveley, Virginia Lynn, Columbia College—Nashville, Tennessee
 Gearing, Linda Cecilia, University of Missouri (Columbia)—Alton, Illinois
 Goode, Linda Raye, University of California (Santa Barbara)—Torrance, California
 Hembree, Judith Ann, Washington University—Kansas City, Missouri
 Holley, Rowena Winn, Belleville Area College—Fairview Heights, Illinois
 McLaurin, Mary Alice, George Williams College—Chicago, Illinois
 Meneer, Susan Estes, Abilene Christian College—Paducah, Kentucky
 Miyashiro, Peter Iwao, University of Hawaii—Honolulu, Hawaii
 Moore, Michele Sisson, Milliken University—Belleville, Illinois
 Reed, Beth Ann, Memphis State University—Charlotte, North Carolina
 Rose, Ruth Harriet, Washington University—Evanston, Illinois
 Shapiro, Ellen, Washington University—Riva, Maryland
 Vignone, Susan Jane, Washington University—Farmington, Connecticut
 Whalen, Peter John, Brescia College—Lakeville, Connecticut

Junior Class 1972-73

Cox, Julie Ann, Southern Illinois University (Carbondale)—Carlinville, Illinois
 Damkroger, Teresa M., Midland Lutheran College—DeWitte, Nebraska
 Gass, Judith Clair, B.A., Elmhurst College, '61—St. Louis, Missouri
 Gayer, Mark J., University of Nebraska (Lincoln)—Grand Island, Nebraska
 Grayson, Beth Gloria, Florissant Valley Community College—Ferguson, Missouri
 Harvey, William Wayne, Meramec Community College—St. Louis, Missouri
 Hasselbring, Caryn Grace, Washington University—St. Louis, Missouri
 Hepler, Mary Louise, Southern Oregon College—Molalla, Oregon
 Lapp, Karen Lea, University of Utah—St. Louis, Missouri
 Lauve, Richard Donald, Florissant Valley Community College—St. Louis, Missouri
 Loethen, Claudia Ernsting, Illinois State University—Troy, Illinois
 McBride, Alan L., University of Missouri (Columbia)—West Des Moines, Iowa
 McQuillan, Julie Ann, University of Delaware—Ballwin, Missouri
 Merandi, Margaret Ann, Golden West College—Kirkwood, Missouri
 Mohr, Arva J., Southeastern Community College (Keokuk)—Donnellson, Iowa
 Pratt, Brenda, Illinois State University—Strawn, Illinois
 Schneider, Charlotte Ann, Rocky Mountain College—Billings, Montana
 Schwartz, Ilene Joy, Washington University—Minneapolis, Minnesota
 Suggs, Ethel Maureen, Washington University—Chattanooga, Tennessee
 Thompson, Charles W., Meramec Community College—Arnold, Missouri



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Washington University

All schools are located on the main campus at Lindell and Skinker Boulevards, St. Louis, Missouri 63130, except Medicine (660 South Euclid Avenue, 63110) and Dentistry (4559 Scott Avenue, 63110).

The College of Arts and Sciences

The Graduate School of Arts and Sciences

The School of Engineering and Applied Science

The Sever Institute of Technology

The School of Architecture

The School of Business and Public Administration

The Graduate School of Business Administration

The School of Fine Arts

The School of Social Work

The School of Law

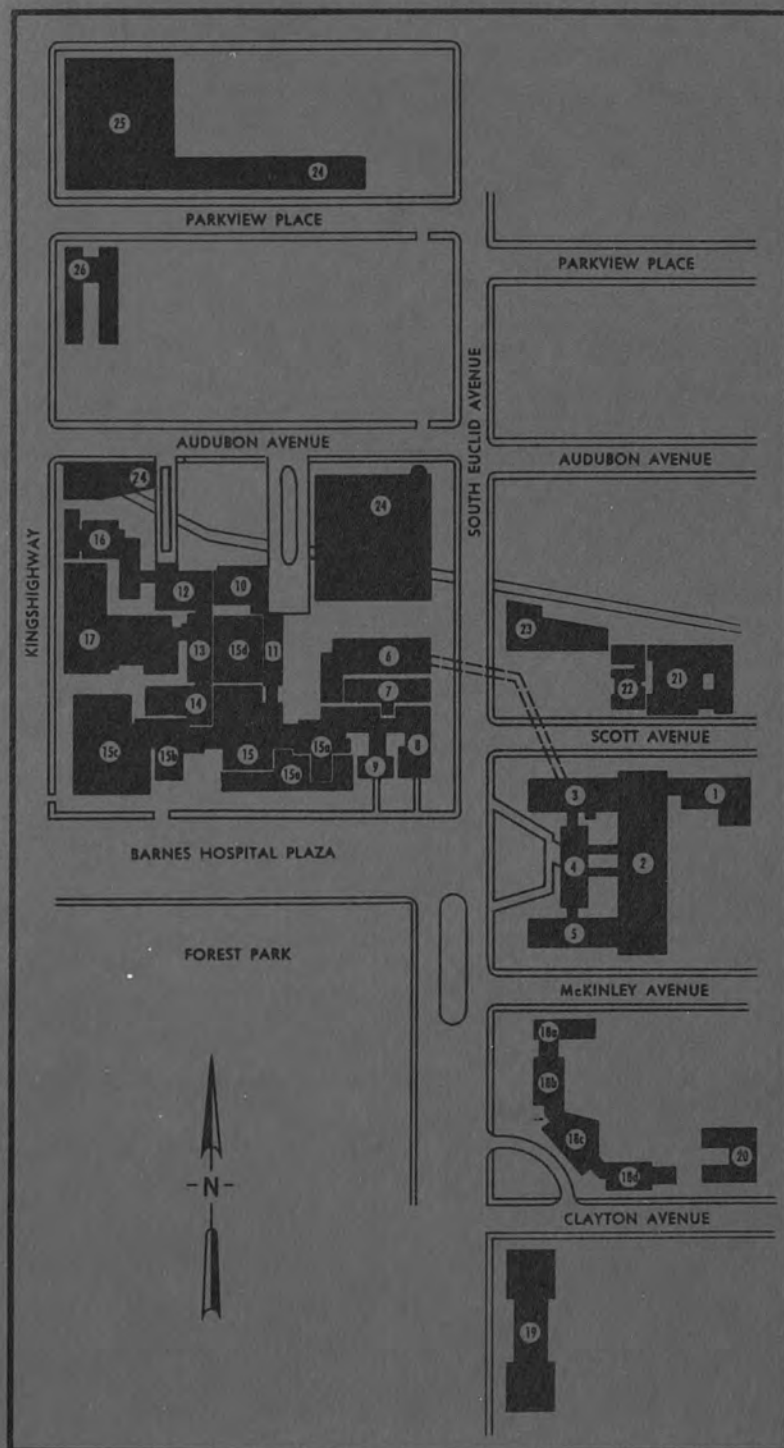
The School of Medicine

The School of Dentistry

University College

The Summer School

WASHINGTON UNIVERSITY MEDICAL CENTER



- 1 Spencer T. Olin Residence Hall
- 2 McDonnell Medical Sciences Building
- 3 North Building (Auditorium, Library)
- 4 Cancer Research Building (Administrative Offices)
- 5 South Building (Basic Sciences Departmental Offices)
- 6 West Building (Pathology, Preventive Medicine, Animal Quarters)
- 7 Irene Walter Johnson Institute of Rehabilitation
- 8 McMillan Hospital and Oscar Johnson Institute for Medical Research (Neurology, Ophthalmology, Otolaryngology)
- 9 St. Louis Maternity Hospital (Obstetrics and Gynecology)
- 10 David P. Wohl, Jr., Memorial — Washington University Clinics
- 11 Renard Hospital (Psychiatry)
- 12 David P. Wohl, Jr., Hospital (Medicine and Surgery)
- 13 Barnard Free Skin and Cancer Hospital
- 14 Edward Mallinckrodt Institute of Radiology
- 15 Barnes Hospital
 - a. Medical Wing
 - b. Rand-Johnson Memorial Surgical Wing
 - c. Queeny Tower
 - d. Diagnostic Laboratories; Service Center
 - e. East Pavilion
- 16 Clinical Research Building
- 17 St. Louis Children's Hospital (Pediatrics)
- 18 700 and 724 South Euclid Buildings
 - a. Biomedical Computer Laboratory
 - b. Physical Therapy
 - c. Hospital Administration, Biostatistics
 - d. Computer Systems Laboratory
- 19 Central Institute for the Deaf
- 20 Central Institute for the Deaf Residence
- 21 School of Dentistry
- 22 Occupational Therapy
- 23 Power Plant
- 24 Parking Garages
- 25 Jewish Hospital
- 26 Jewish Hospital Nurses Residence

